

ABSTRACT

Title of Document: THE BUILDING SKIN AS A CONNECTING
MEDIUM: A CASE STUDY IN TEHRAN

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This thesis will investigate ways in which the building facade can contribute to the city by having the ability to transform and embed within itself functions that go beyond the necessities of the buildings' primary purposes. The buildings' facade therefore will serve as a medium to shelter and initiate different activities and functions such as: circulation, access, view, assembly, growth, as well as communication. This transitory zone, consequently will serve as an organizing urban structural system that can be applied to any public building(s) in order to activate a two-dimensional layer of the building exterior through the means of giving it a third dimension. While being an addition this system seeks to reduce existing issues and to enhance the social and practical necessities pertaining to both the individual building as well as the chosen site.

The selected site for this structure is a square in Tehran, the capitol city of Iran. Although the skin system is designed to be applicable to any building at any public realm, Tajrish Square will serve as the exemplary location for its application. Being culturally rich, and socially valuable, the site chosen for this investigation will demonstrate the adaptive use of the building system being proposed.

THE BUILDING SKIN AS A CONNECTING MEDIUM:
A CASE STUDY IN TEHRAN

By

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Thesis submitted to the Faculty of the Graduate School of the
University of Maryland, College Park, in partial fulfillment
of the requirements for the degree of
Master of Architecture
2010

Advisory Committee:
Professor Garth Rockcastle, Chair
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Professor Hooman Koliji

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Dedication

To my beloved family: my mother, my father, Mehrad and Ali.

my godmother, Mansoureh Jafari

my grandfather who taught me how to live

my dear friend, Mike

..and the land of losses, Iran.

Acknowledgements

I would like to thank my wonderful committee: Professor Hooman Koliji, Professor Brian Kelly, and Professor Garth Rockcastle, for their great scope of knowledge and contribution to this project. I would like to thank Professor Schumacher, for his unknowingly made radical influence in my mindset as an architect throughout my career. Professor Courtney Miller Bellairs, for inspiring me with her color. Professor Ronit Eisenbach, for our roller-coaster rides and learning so much from her in the process. Professor Madlen Simon, for the inspirations I gained from her for this project.

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Chapter 1: Tehran

Iran is a complicated and mysterious country, even to its own citizens, and Tehran is more so. Perhaps this might be due to the country's unique political background and history; however, what sets Tehran apart from most other megacities in the world today is an underground battle between modernity and conservatism. A capital that was merely a small town 100 years ago has now become a more or less modern metropolis while having undergone monarchy, a revolution, and religious dictatorship¹.

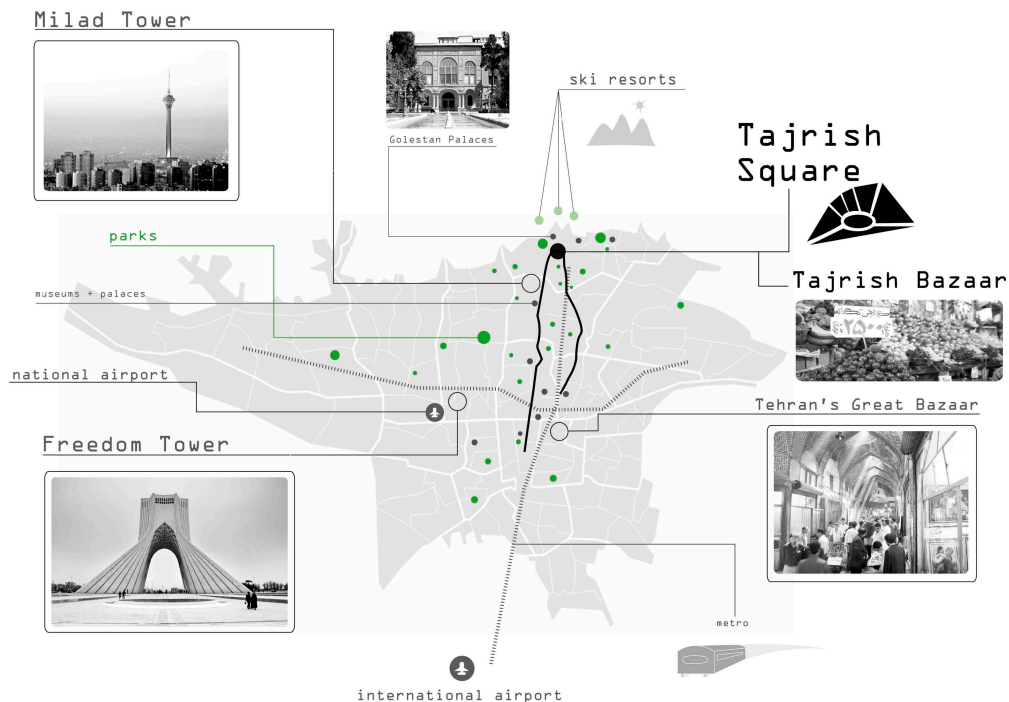


Figure 1 Map of Tehran and its attractions [Image created by author]

Although Tehran is not Iran, but without this great metropolis, which is the focal point of Iran's transportation network and the center in which more than 40% of the nation's economic activities take place, it would not be possible to fully comprehend the ever-changing Iran². Tehran can be said to be a reflection of Iran. Those who inhabit this young city have come from around the country with different cultures, languages, and life-styles and live in a national-international context together. The idea that Tehran can be the reflection of Iran's future is therefore concluded upon the understanding that modern societies tend to take form in large cities.

¹ Tahami, Javad, and Farshad Abrishami. Tehrane Ghadim.

² Habibi, Mohsen. Atlas de Teheran Metropole



Figure 2 Tehran: Residential towers [Image provided by author]

Location and climate

Tehran, the capital city of Iran for more than 2 centuries was once a small town but today ranks amongst the largest and most populated cities in the world³. The city is located on a gently sloping plain between the southern slopes of the Alborz mountain chain and Iran's Great Central Desert. Today the city has expanded northward right up to the foot of the mountains and southwards to the edge of the desert.



Figure 3 Tehran against the mountains of the north and the plains of the south [Image provided by Google Earth]

³ Habibi, Seyyed-Mohsen, and Bernard Hourcade. *Atlas De Téhéran Métropole*.

Tehran has a dry climate. Unlike many other cities of the Middle-East, however, Tehran does not have a shortage of water supply. Heavy rainfalls in the Alborz Mountains, mainly as snow, provide a fairly reliable source of water supply for Tehran's residents⁴. This water flows through a number of rivers and flood canals toward the desert in the south. Urban development has often relied on access to water sources. At these heights and on the slopes there are many footpaths and climbers' shelters for hikers and rock climbers, many cafes and restaurants and two skiing resorts connect those resorts to the city with cable cars.

At the foot of the Alborz Mountains, there is a large area of hilly terrain and river valleys, formerly filled with charming villages, Persian gardens and fruit orchards but is now mostly urban and residential. In Tehran, the wealthy have built their houses in the higher elevations in order to enjoy a cleaner and more abundant water supply. This area, which falls mostly within the boundaries of Shemiranat District (District #1), is the most expensive and exclusive part of Tehran. The climate is temperate and pleasant in the summer and quite cold in the winter and the rainfall and snowfall are much heavier than in the other parts of the city.

In the south of Shemiranat, there is a vast plain sloping very gently from north to south. It is mostly featureless except for a few hilly outcrops. Most of Tehran, including the old city centre and bazaar are situated on this plain. It has hot summers, cold winters and scanty rainfall. The climate becomes warmer and dryer as you go further south where the city reaches onto flat agricultural lands and eventually into the great desert with its dry valleys and salt marshes.

Historical Background

Until the 9th century, Tehran was merely a village. Later In the 13th century when the Mongols destroyed a nearby city that was flourished, Tehran began to gain in its population. Later in the 17th century when the Safavid rulers took residence in Tehran, the city became walled and a Bazaar was added⁵. In the beginning of 18th century, a king of the Zand Dynasty ordered for his palace and government office to be built in Tehran in order to declare Tehran

⁴ Habibi, Seyyed-Mohsen, and Bernard Hourcade. *Atlas De Téhéran Métropole*.

⁵ Nowruzitalab, H.R. *Tehran Past and Present*

as his capitol but was discouraged before its completion. Tehran finally became the capital of Iran in 1795, when a king from the Qajar Dynasty was crowned in the city and has remains the capital to this day.⁶

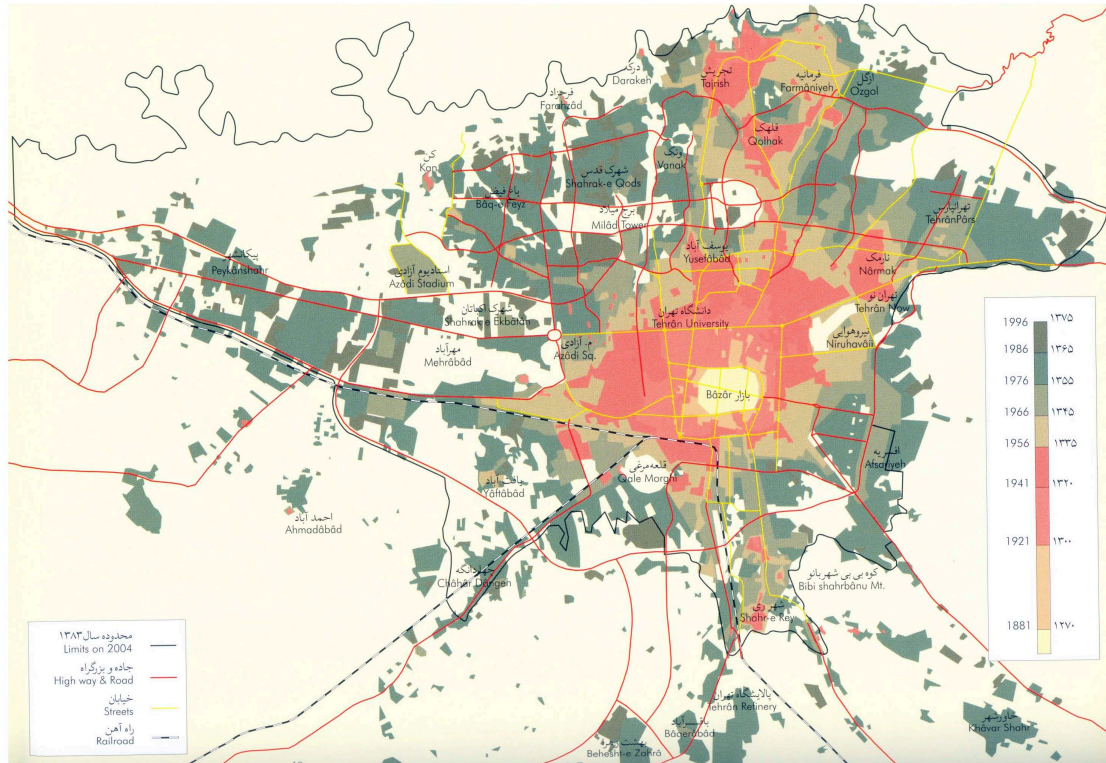


Figure 4 Tehran’s growth beginning with the Grand Bazaar from 1881-1996 [Habibi, M. *Atlas de Teheran Metropole*]

Following a revolution in 1979 which resulted in the fall of monarchy in 1979 and its transformation into the Islamic Republic, the city went through a confusion phase both architecturally and urbanistically. Urban plans and developments designed to occur by the last King (the Shah), went unrecognized and some were demolished. Later following the Iran-Iraq war, which happened on the same year, cheap Soviet-style apartments multiplied throughout the city without any plan. At present, little is left of Tehran’s old quarters. Instead, modern high-rise buildings dominate the city and new modern apartments have and still continue to replace the few remaining old houses at a rapid pace. Tehran-style home architecture has almost vanished completely. This is often referred to as “Tehran Identity Disaster”.⁷

⁶ Nowruzitalab, H.R. *Tehran Past and Present*

⁷ Zakerzadeh, Amirhossein “Tehran’s Biography”

With the fall of the Shah in 1979, so fell the cultural, industrial, and architectural advancements of the country. The western schools of thought both in architecture and urbanism were beginning to develop quite strongly prior to the revolution by which the country fell apart in almost all areas of progress. The streets of Tehran were planned following the western style of street hierarchy. Plans such as the Pahlavi Avenue began to take more organic forms through the years after the Islamic Revolution. The Pahlavi Avenue, which extends from the city's north to south is still the main north-south avenue designed based on the Champs Elysees of Paris. Like many Iranian streets, the street's name was changed from 'Pahlavi' to 'Valiasr' after the Iranian Revolution in 1979. The modern Western-style of Tehran's buildings, particularly in the center where buildings are gray matchbox designs, can be traced to the English influence on 19th-Century Iranian architecture when the kind of the time began to adopt Western styles in construction and design⁸.



Figure 5 Pahlavi Ave. with an array of aged trees that run their course all the way to Tajrish Square, extending from north to the south of Tehran[Image provided by author]

Tehran's identity disaster today however, also extends into the fields of urban design and planning. The city is faced with a rapid and uncontrolled sprawl from all directions (specially the north, towards the Alborz Mountains). As a

⁸ Nowruzitalab, H.R. *Tehran Past and Present*

result a large number of alleys and streets that were at one point pedestrian paths and access ways through garden and plots of land have become major means of circulation. Also, as a result of sprawl into the mountainous area with its irregular topography, large plots have been subdivided and sold at irregular shapes that have also worked against a systematic growth of the city.

Today, the older neighborhoods of Tehran are located at the southern regions of the city (where the grand Bazaar was first built) and as you gradually reach the north of the city the neighborhood begin to take a more modern look. There is also a class variation between the lower (more southern) regions of the city and the upper regions. This class variation ranges from lower income and more religious to higher income and the more liberal as the slopes rise and as one comes closer to the Alborz Mountains in the north.

Life in Tehran

Unlike what the city might be stereotyped as, Tehran is quite a clean city where almost everything can be found. Its built environment has a simple practicality to it that is admirable. Being located on the southern slopes of the Alborz Mountains, Tehran is a city with three distinct geographical elements: the mountain itself, the mountainside, and the desert. This has created for the city's unique natural, social, and cultural environment: from high to low, from cold to warm, and from summer in a very short time⁹. The city has therefore become a multifaceted city where each part of it has its own characteristics. The northern area for example differs from the center, and yet the center completely differs from the southern and western areas of the city. Unlike most cities central Tehran is not the commercial and financial heart of the city, historically the commercial center has always been in the south.

Currently however, the north has become a strong competitor in terms of dominating businesses, trade and modern construction projects. Central Tehran houses a large number of ministries, museums and hotels, including the Museum of Contemporary Art and the Persian Carpet Museum¹⁰. Tehran's true importance and character however, is evident in the southern and northern areas. The city's south, which was the real heart of the city

⁹ Habibi, Seyyed-Mohsen, and Bernard Hourcade. *Atlas De Téhéran Métropole*.

¹⁰ Nowruzitalab, H.R. *Tehran Past and Present*

throughout the 20th Century, is home to Tehran's Grand Bazaar as well as Iran's most remarkable museums, including the National Museum of Iran and the Golestan Palace in the 16th century. All in all, within the chaos of buildings, traffic, and interweaving roads and streets, the Alborz Mountain range frames the entire capital and transforms it from a plain city into a beautiful one.

Tehran has been a city with a fast urban growth rate in all four directions. As for the north, which used to be a semi-rural area approximately 30 years ago, the growth is currently paused by the city's planners due to safety risks. The northward growth however has now become Tehran's most exclusive neighborhood¹¹. This area consists of the residences of well-off senior officials and has the largest number of foreign embassies and modern shopping malls selling European and American goods. It is not very difficult to find upscale restaurants and cafes, which are scattered along the slopes of the mountains. A short commute from the southern or central area to the north reveals a great cultural gap. The traffic is relatively quieter, and on the streets one sees Western-style high-rises and modern spacious villas with their swimming pools and gardens concealed behind iron gates and walls that reflect the immense wealth of their residents.

Shopping malls sell the latest trends in fashion, electrical appliances and entertainment devices. The northern area is the neighborhood of choice for Iran's high class, state officials, merchants, entrepreneurs, engineers, doctors, writers and publishers, who are continually traveling to the United States, Europe and the Arab States. The prosperity of the north is mirrored in the cars around the area; unlike the Iran Khodro cars that dominate central Tehran, the northern region is filled with imported cars that are much more expensive. In this area, it is also quite common to see females wearing full makeup and dressed in elegant clothes that are comparatively more revealing. They wear colorful headscarves; it is rare to see a woman dressed in a black chador in this area of the city; unless near religious centers.

Between the capital's wealthy north and its poverty-stricken south, is Tehran's Grand Bazaar. Known as one of the oldest and largest bazaars in the world, it is estimated to direct approximately 30% of the trade that occurs in Iran¹². Carpet merchants specially, are in charge of large capital and like banks; they can lend money in return for a small interest.

¹¹ Zakerzadeh, Amirhossein. *Tehran's Biography*

¹² Zakerzadeh, Amirhossein *Tehran's Biography*

A section of the bazaar was created during the reign of the Safavid dynasty and up until the 17th Century most of the bazaar area was still uncovered rather than its present covered state¹³. Divided into narrow corridors, each alley has merchants who specialize in a specific trade; one corridor has merchants selling gold jewelry, another for carpets, fabrics and scarves, a third displays traditional handcrafts as well as others for foods and spices, and even home appliances.

Following the same format as most mosques and bazaars in Iran do, at the heart of the bazaar in Tehran resides the Imam Khomeini Mosque (former Shah Mosque) and in this case the Golestan Palace. Together, the marketplace, mosque and the palace create the triangle of authority in the south¹⁴. The Golestan Palace was the ruling palace during the 1830's. Within the bazaar lies the Imam Khomeini Mosque, which was built at the turn of the 18th Century and has a courtyard that opens onto the bazaar. Historically, the mosque has always played a role in bringing the bazaar merchants closer to the authorities since the merchants would join one another inside the mosque for prayers, after which they discussed their concerns, coordinated over all matters including electoral voting and determined their interests operating as an organized lobby or pressure group¹⁵.

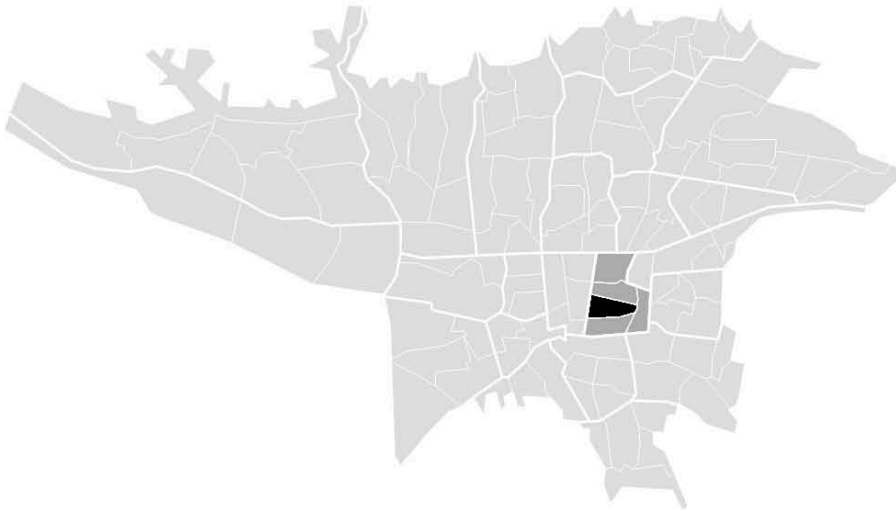


Figure 6 Relationship of the Grand Bazaar's location (where the city initiated), to the rest of the city [Image used from Wikipedia, the Free Encyclopedia]

¹³ Haji-Qassemi, Kambiz. *Bazaar buildings*

¹⁴ Kiani, Muhammad Yusuf. *Memarie Iran*

¹⁵ Shahid Beheshti University "Spiritual Buildings of Tehran"

Today however the bazaar is not at the center of the city and it is located in the low-scale parts of the capitol. With its importance in the economy still in tact however, much of the finance has moved to the northern regions of the city. The Tajrish bazaar located in the northern regions is a small competitor to the Grand Bazaar selling most of its traditional good at higher prices. As the Grand Bazaar lost its centrality through the years, the Tajrish Square and Tajrish Bazaar have gained value as the more modernized city center in Tehran.

Traffic

Tehran is a city that is highly congested with cars. With millions of cars on its streets, automobiles exceed the capacity that the streets of the city can accommodate. An Iranian automobile company that has been manufacturing cars for the past decades with an affordable price for Iran's middle class can be accounted as one of the reasons. Eighty percent of car spare parts are locally made in Iran, including the exhaust pipes that are responsible for polluting Tehran's air, in addition to being the primary cause for the death of 5,000 people annually from diseases related to air pollution.¹⁶

Driving in Tehran is the most challenging daily experience as most cars, buses, and motorcycles come from every direction speeding without signaling or slowing down. Traffic related accidents are estimated among the world's highest rates making driving in Tehran a risky experience, particularly in the northern regions due to mountain inclines. A large number of accidents involving cars and motorcycles of which most result in injuries tend to occur on daily basis. Yet despite that, most of the government's developments and restrictions on cars and motorcycles have only slightly contributed to lessening the traffic congestion problem in this overcrowded city.

A unique transportation system in Iran is private cars. Private cars in Iran can operate as taxis without a license or any special signage. In Tehran a very lavish private car operating as a taxi in the afternoon or during the night is not unusual or illegal. There has been an increase in the number of private taxis, as Iran has been through bad economic conditions for the past few decades after the revolution, and as a result the youth's need for income sources has increased.

¹⁶ Habibi, Mohsen. Atlas de Teheran Metropole

Pollution

Tehran suffers from severe air pollution and the city is often covered by smog that at times makes breathing difficult and causes widespread illnesses. It is estimated that about 27 people die each day from pollution-related diseases only in Tehran. The air pollution is due to several different reasons: 1) Economical: most Iranian industries are located on the outskirts of Tehran. The city is also overrun with old and aging cars that do not meet today's emission regulations. Furthermore, Iran's busiest airport, Mehrabad International Airport, is located in the west of the city; 2) Infrastructure: Tehran has a poor public transportation network. Buses and metros do not cover every area of the city. Most people are therefore forced to either use cars or take the taxis. This has created severe traffic congestion; 3) Geographical: Tehran is bound in the north by the massive Alborz mountain, which stops the flow of the humid Caspian wind. As a result the "thermal inversion" that traps Tehran's polluted air is easily observed. Also, the lack of humidity and clouds makes Tehran a very sunny city. As a result, the UV radiations get combined with the existing pollutants and significantly raise the level of the ozone.¹⁷

The government, however, has been fighting (for many years) to reduce the air pollution. It has for example, encouraged taxis and buses to convert from petroleum engines to engines that run on natural gas. Also, since 1979 Islamic Republic has set up a "Traffic Zone" that is applied to the city center during rush hours. Entering and driving through this zone is only allowed with a special permit. The government is also trying to raise people's awareness about the hazards of the pollution. One method that is currently being employed is through the placement of Pollution Indicator Boards around the city in order to report pollution levels. This and many other schemes have been developed in order to increase people's awareness and reduce the amount of pollution.

¹⁷ Zakerzadeh, Amirhossein. *Tehran's Biography*

Contradictions



Figure 7 Iranian women are forced to hide beneath the Islamic veil contradictory to what their true beliefs might be [www.ifawards.com/film/my-tehran-for-sale]

Tehran isn't only the capital but also the largest city in terms of both, size and population. The city has a population of 14 million people consisting mostly of youth¹⁸. As a result Tehran has the most movie theatres, universities, restaurants, public parks, and shopping malls. Also, as a result of the numerous universities in Teheran, the capital is regarded as the city for youth, its population of youth higher than any other Iranian city. Generally, one can say that Iranian youth are quite open-minded and exposed to the outside world in addition to being knowable in terms of the events taking place worldwide by virtue of watching satellite channels.

As a city with many contradistinctions, current Tehran is a city covered by a facade behind which a great deal can be discovered. Most people, specially the young live secret lives where they attend mixed parties and gatherings, dance, drink alcohol and enjoy wearing as they please behind closed doors. Yet, while life can be as free as anyplace else inside the house, once the public realm is entered tattoos and earrings, short skirts and bellybuttons, ties and bowties, are either removed or covered beneath the Islamic skin. In Tehran therefore, what is seen is often not what the reality is, and even the reality is not reliable. Since the Islamic Revolution of 1979, Iran has been covered by an Islamic veil, through which the rest of the world has rarely been able to access. This cultural confusion and polarization however, is most apparent in Tehran than the rest of the cities in the country. In this culturally ambiguous city modernization, Persian tradition, and Islamic enforcements

¹⁸ Habibi, Mohsen. Atlas de Teheran Metropole

have created a unique society within which a great deal can be discovered and studied. That is why Tehran can be described as the city of contradictions where architecture and urban planning can help rid the city from its ambiguities and allow for a freer environment in order for its citizens (specially the young), to be able to freely socialize and express themselves.

Chapter 2: The Building Skin

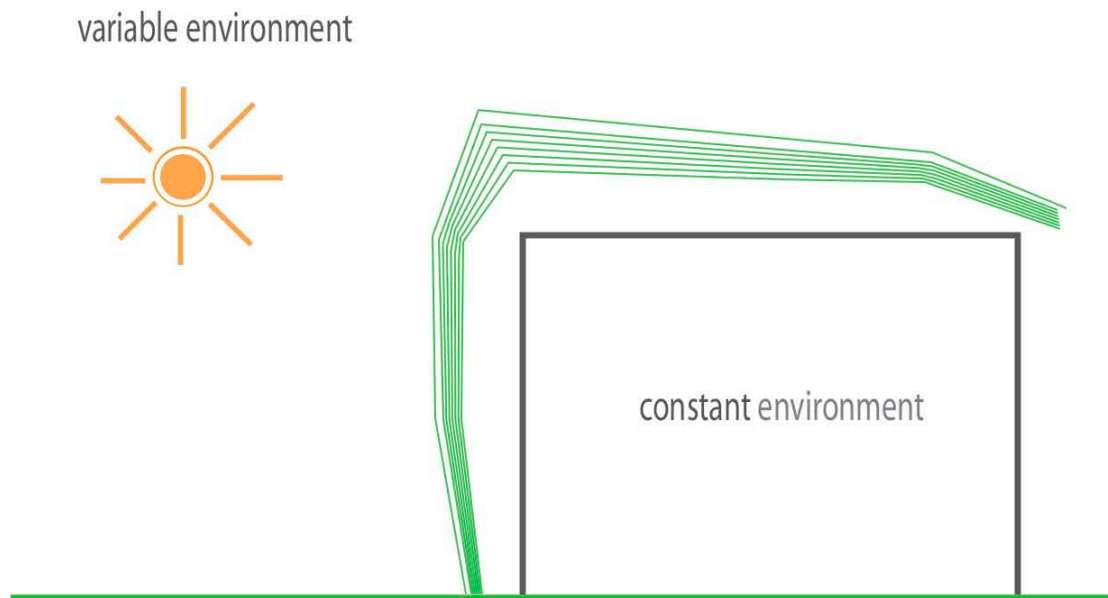


Figure 8 The façade as the zone where public and private meet [Image provided by author]

The 'façade' or "frontage" is often one or two specific sides of the exterior of a building, which generally tends to be the front. From the design standpoint it is considered to be one of the most important aspects of the building as it sets the tone for the building itself as well as its relationship to the environment that surrounds it. It is often elaborated either through ornamentation or decorative characteristics. Although the façade plays an important role as a building element there are a wide variety of tasks that can be contributed to it since it is such a critical layer. Recognizing the façade as a layer within which a multitude of functions can take place as well as the means to reshape and revitalize the urban space.

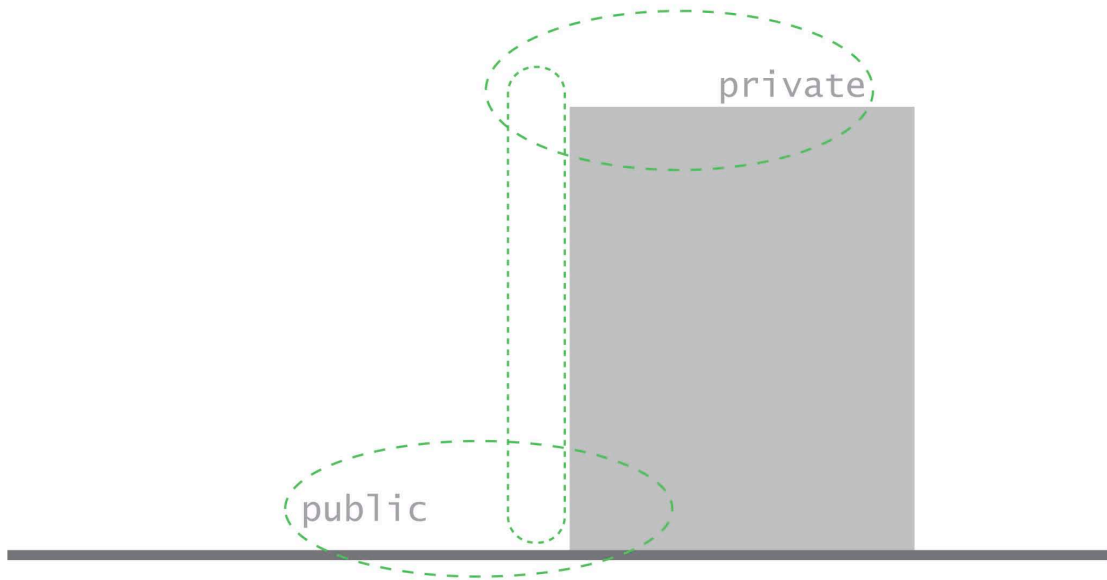


Figure 9 The façade as the zone where public and private meet [Image provided by author]

While such examples do exist and are most often commended in design magazines and as precedents for designers to look at, we rarely see them established as design concepts. If the individual ideas, the technology, and the possibility is available to us to make use of it why then, don't we begin to think differently and holistically? Why don't we knit together what is available to do more, with less? Why doesn't the facade do more than masking the building, letting air in, or invite us into the building only at the ground level?

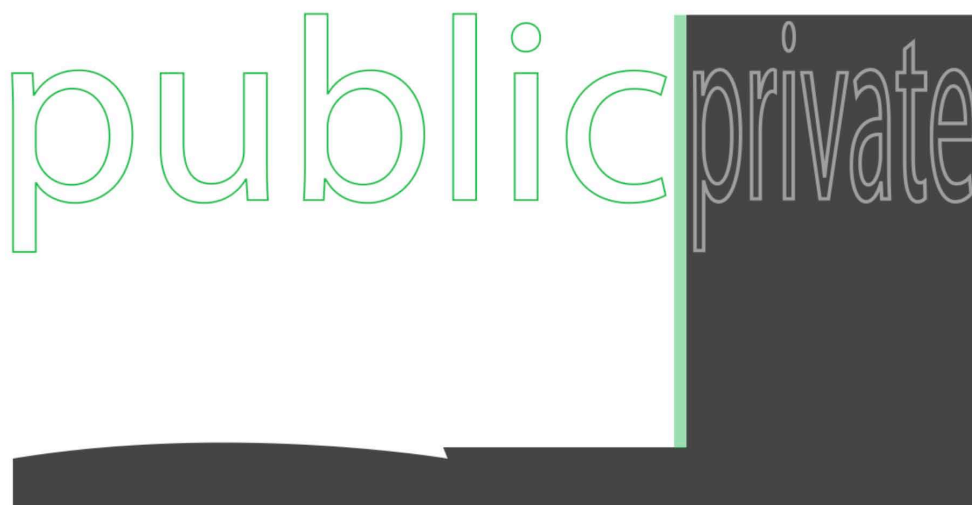


Figure 10 The façade: the separating layer [Image provided by author]

The facade acts very similar to the roof in that it has the job of providing for protection from the exterior; which makes us wonder why we don't leave the façade unadorned similar to the roof architecturally. In literature, the facade is described as the "false front." The relation between the two definitions, the architectural and the literal, is a perception that can be questioned. Perhaps the literal connotation, which describes the façade as more of a mask, can also relate to that of the architectural one in that the building façade, acts as the disguiser of the activities and functions occurring beneath it. At the same time in architecture, the façade is treated as a beautiful mask therefore having an aesthetic purpose, which addresses the value of the building exterior's appearance to the public realm.

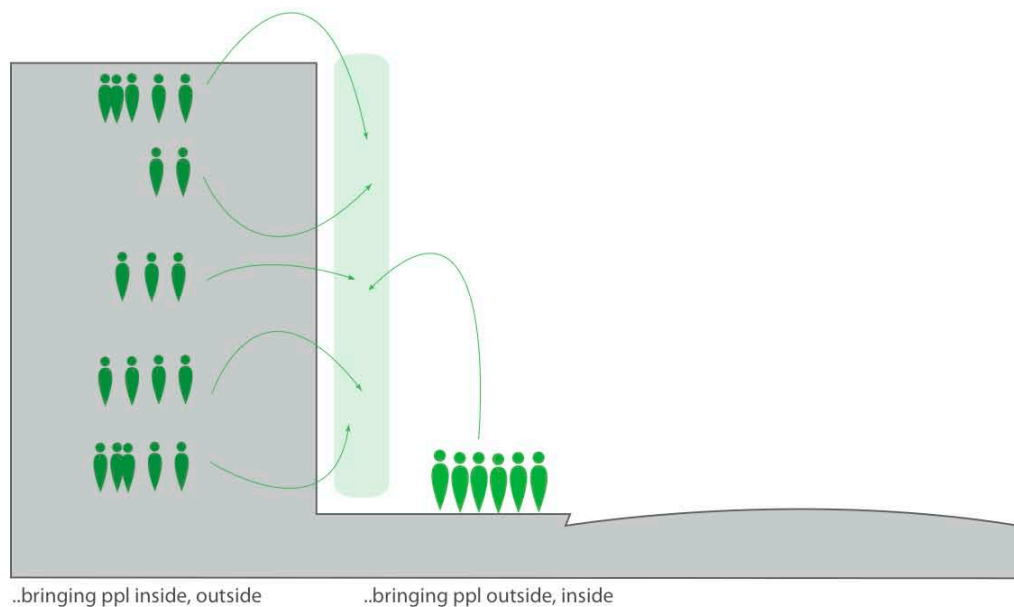


Figure 11 The façade as a medium for other public/private activities [Image provided by author]

The façade therefore, is a crucial layer. A layer that protects, masks, and aesthetically influences the public realm. It is the often-thin layer that concludes the edge of the building and introduces the edge of the city. Why then make it a false, artificial, or concealing layer? Why not bring together the laudable techniques of the past and the advancements of the present to think about it as a medium?

Facades as Liners

Architecture and Urbanism are so deeply interrelated that it becomes impossible to discuss one without the other. Interventions in the urban fabric of the city provide the potential for architectural development, while large-scale architectural developments have the potential to change the urban fabric of the city. Much of this redevelopment has come in the way of using facades as liners. By reconstructing the facades of buildings situated in major urban squares of a city, architects are able to alter the relationship between the building and the space surrounding it in favor of increased architectural regularity and visual order.

Campidoglio, Michelangelo, Rome

One example of this is Michelangelo's project for the Campidoglio in Rome. One of his first commissions in Rome, the project was to reestablish the grandeur of Rome by developing the Campidoglio, which was the ancient seat of government on the Capitoline Hill. At the time, the space consisted of an irregular hilltop and two crumbling medieval buildings set on acute angles from each other. In response, Michelangelo used a trapezoidal square to help regularize the geometry established by the existing buildings. He used the facades of the buildings as liners in order to create axiality and symmetry within the square. He gave the Palace of the Senators a central campanile, a renovated façade, and a grand divided external staircase. For the Palazzo dei Conservatori, he designed a new façade with sizeable Corinthian pilasters extending over two stories. To create balance in the square, he designed the Palazzo Nuovo with an identical façade for the opposite side of the square. By using the facades as liner, he was able to create an edge that made the whole area a defined and finished space.

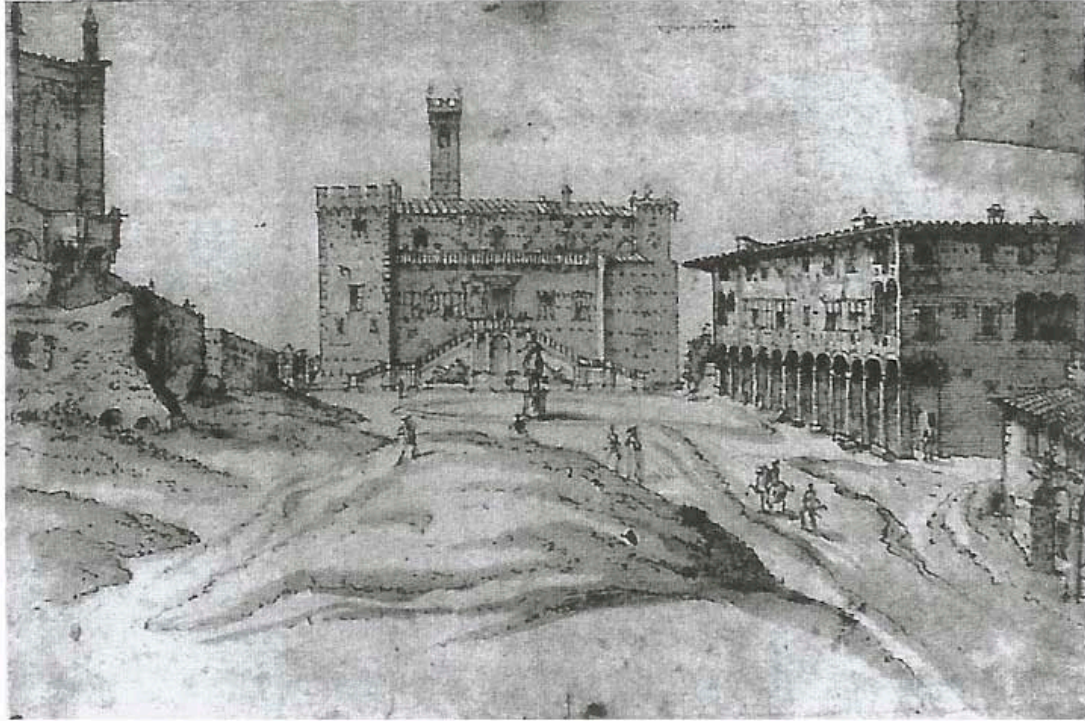


Figure 12 Piazza del Campidoglio, Rome, 1555, Anonymous drawing. Shows the irregular hill and two medieval buildings. [Liberman, A. *Michelangelo's Roman Capital*]

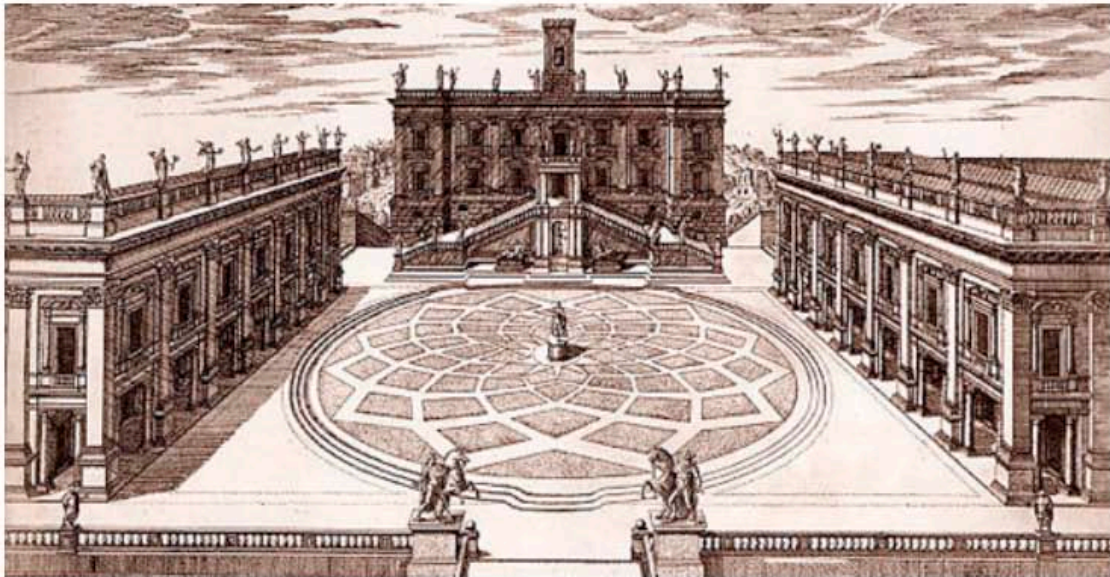


Figure 13 Michelangelo, Project for Piazza del Campidoglio, 1569, Etienne Duperac. Shows the redesigned façades which help define the space. [Liberman, A. *Michelangelo's Roman Capital*]

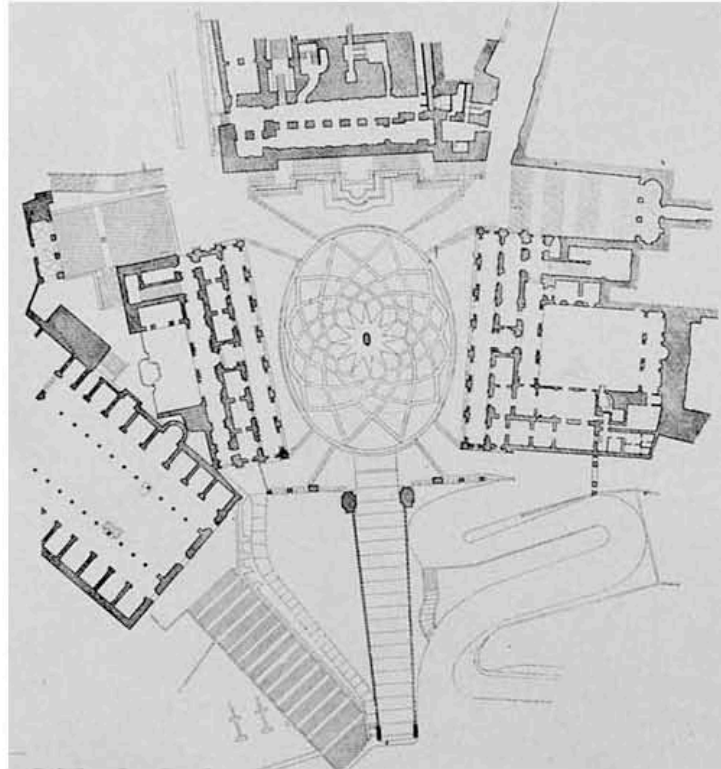


Figure 14 Michelangelo, Project for Piazza del Campidoglio, Plan shows how the facades are similar but the buildings differ in shape and size. [Lieberman, A. *Michelangelo's Roman Capital*]

Time Square, NY

Another example of using facades as liners is Time Square. With its dazzling lights and teeming crowds, Times Square is one of the world's most renowned urban destinations. A cultural hub full of theaters, music halls, and upscale hotels, this area is defined by the huge number of animated neon and LED signs which have long made them one of New York's iconic images, and a symbol of the intensely urban aspects of Manhattan. Times Square is the only neighborhood with zoning ordinances requiring building owners to display illuminated signs. And it is this density of illuminated signs in Times Square that creates a liner that defines the space.



Figure 15 Time Square, New York City, USA. The irregularity of the façade created by the illuminated signs define this space. The liner is created by a backdrop of various television screens and displays, which project consumer ads and information to the people who inhabit the square [Michael McDonough www.flickr.com/photos/mikemcd/]

Sustainable Facades

Yale Sculpture Building and Gallery



Figure 16 Yale Sculpture building double skin system [Image acquired from KieranTimeberlake Architects]

The Yale sculpture Building enhances light, air quality, and energy throughout the building simply through its architecture. The building's facade is almost entirely transparent or translucent, allowing daylight to wash through the interior. What is most significant about the building's skin is the mullion system used to help with the air temperature within the building. As Rows of triple-glazed, argon-filled, low-emissivity vision panels are separated by rows of spandrel panels consisting of low-emissivity insulated-glass units at the exterior, a 3-inch airspace, and a 2.5-inch space filled with translucent aerogel insulation. These spandrel panels transmit 20% of visible light, while offering an insulation value at their center of more than R-20. The curtain

wall's average insulation value is R-8, about four times better than that of a conventional curtain wall.

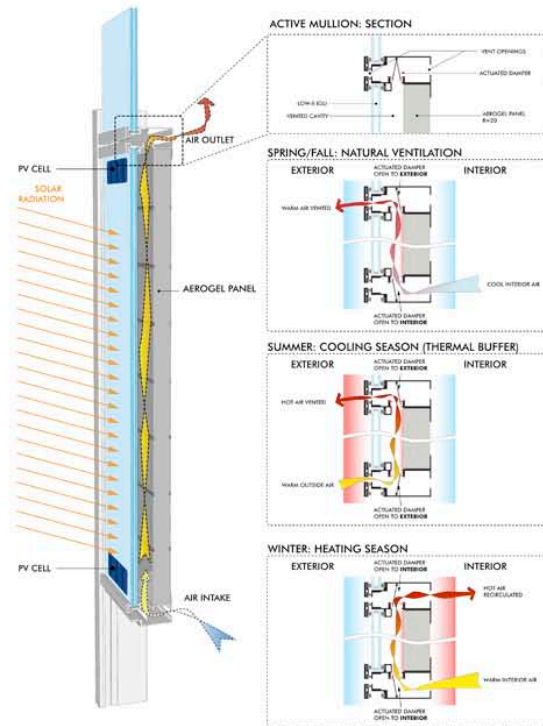


Figure 17 Active mullion system and aerogel panels [Image acquired from KieranTimeberlake Architects]

The building has introduced a top/bottom mullion with an integral operable damper and multiple ventilation apertures. The custom mullion/damper allows for iterations, test and validate ventilation strategies to optimize airflow between the out-board IGU and in-board Aerogel panel. An anemometer allows for monitoring the air movement through the mullions and air chamber. Sensors also monitor the ambient air cavity temperature, surface temperature of the exterior face of Kalwall, and incident solar energy.

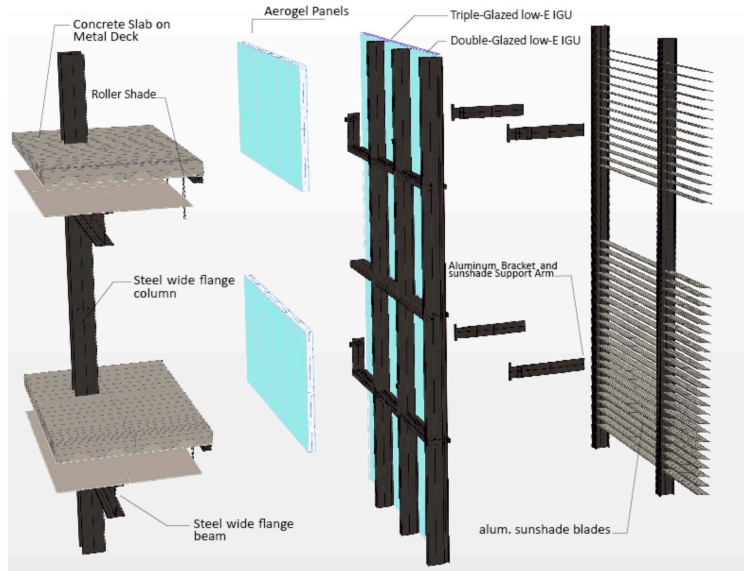


Figure 18 Structural Layering [Image created by author]

Winter heating therefore takes interior air, heats it within the cavity and vents it back to the interior. Summer thermal buffering takes outside air into the cavity, heat it, and vent it back outside, minimizing thermal gains through the assembly. Natural ventilation for Fall/Spring seasons also draws air from inside, heats it and thermally drives it outside.

Inhabitable Facades

Louis Kahn, Exeter Library



Figure 19 A good example of an inhabitable skin where the reading carrels are embedded within the load –bearing façade to make use of the light as well as the view [www.designlaboratory.com]

Louis Kahn's Exeter Library is an example of an occupyable facade. The library is constructed in three concentric areas. The inner area is the atrium. The middle area, which contains the heavy book stacks, is made of reinforced concrete. The outer area, which houses the reading carrels, is made of brick. The outer area or facade, consists of four brick structures, each of them 16 feet deep. The bricks are load bearing in that the weight of the outer portion of the building is carried by the bricks themselves, not by a hidden steel frame. Kahn calls this fact to the viewer's attention by making the brick piers noticeably thicker at the bottom where they have more weight to bear. For Kahn, the essence of a library was the act of taking a book from a shelf and walking a few steps to a window for a closer look: "A man with a book goes to the light. A library begins that way. He will not go fifty feet away to an electric light." So it is within this thicken facade that Kahn placed the reading carrels.

Docks De Paris City of Fashion and Design

Jakob + MacFarlane designed the City of Fashion and Design on the docks of Seine's Left Bank features a green metal pipe structure that envelopes an existing 1907 concrete warehouse. Instead of destroying the existing building, the architects decided to keep it and apply a new façade over the building. This inhabitable façade serves to both protects the existing structure as well as forms a new layer containing most of the public circulation systems and added program, including creating a new top floor to the existing building. This skin is created from a glass exterior skin, steel structure, wood decking and grassed, faceted roofscape. The skin operates not only as a way of exploiting the maximum building envelope but enables a continuous public path to move up through the building from the lowest level alongside the Seine to the roof deck and back down, a kind of continuous loop enabling the building to become part of the urban condition.



Figure 20 Docks De Paris City of Fashion and Design showing new façade overlaid over existing concrete building [www.contemporarist.com]



Figure 21 Showing thickened façade [www.contemporarist.com]

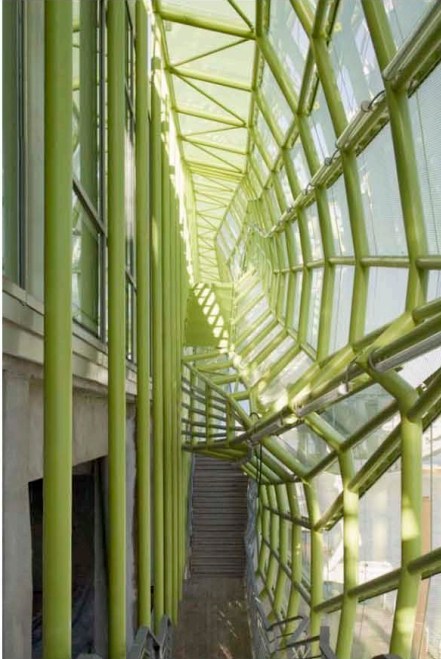


Figure 22 Docks De Paris City of Fashion and Design showing inhabitable space within the façade [www.contemporarist.com]

Temporary Facades

Temporary facades are facade conditions that change the existing facade for a period of time. While often times, these facades are used as a tool for thinking about, promoting, and establishing public space, other instances of this type of facade are purely utilitarian. No matter the reason, these facades change the character of the façade beyond.

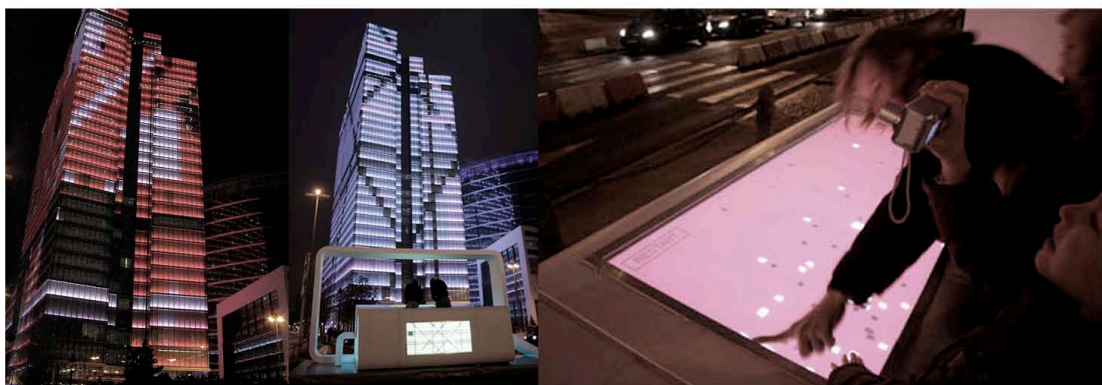


Figure 23 The Dexia Tower [www.dexia-tower.com]

One example of this is Lab[au] or Laboratory for Architecture and Urbanism project TOUCH, which is an interactive installation located on the facade of the Dexia Tower. The Dexia Company, a bank that specialized in financial

services for the local government, wanted the building to be recognized as a city landmark. To do this, the Dexia Tower was designed with 4200 windows that can be individually lit by RGB LED bars. From a kiosk placed on a plaza in front of the building, random people could use a multi touch screen to manipulate the color pattern of the tower. This manipulation not only affected the façade of the Dexia Tower but with the light reflected on the adjacent buildings, the color and character of the public space was transformed as well.



Figure 24 Artificial and temporary skinning through the construction process in Venice vs. basic scaffolding system creating a new space [images provided by author]

Although TOUCH existed only for a matter of days, scaffolding typically exists for months to years and has a substantial impact on the built environment. Scaffolding is a temporary structure that is used to support people and materials in the construction and repair of buildings. Usually modular, the system consists of tubes or pipes made of metal, wood, or bamboo. Underneath the scaffolding consists of a sidewalk shed, which protects passerby from falling debris. Usually this contains advertisements by the developer for the building beyond the scaffolding.

Chapter 3: Site

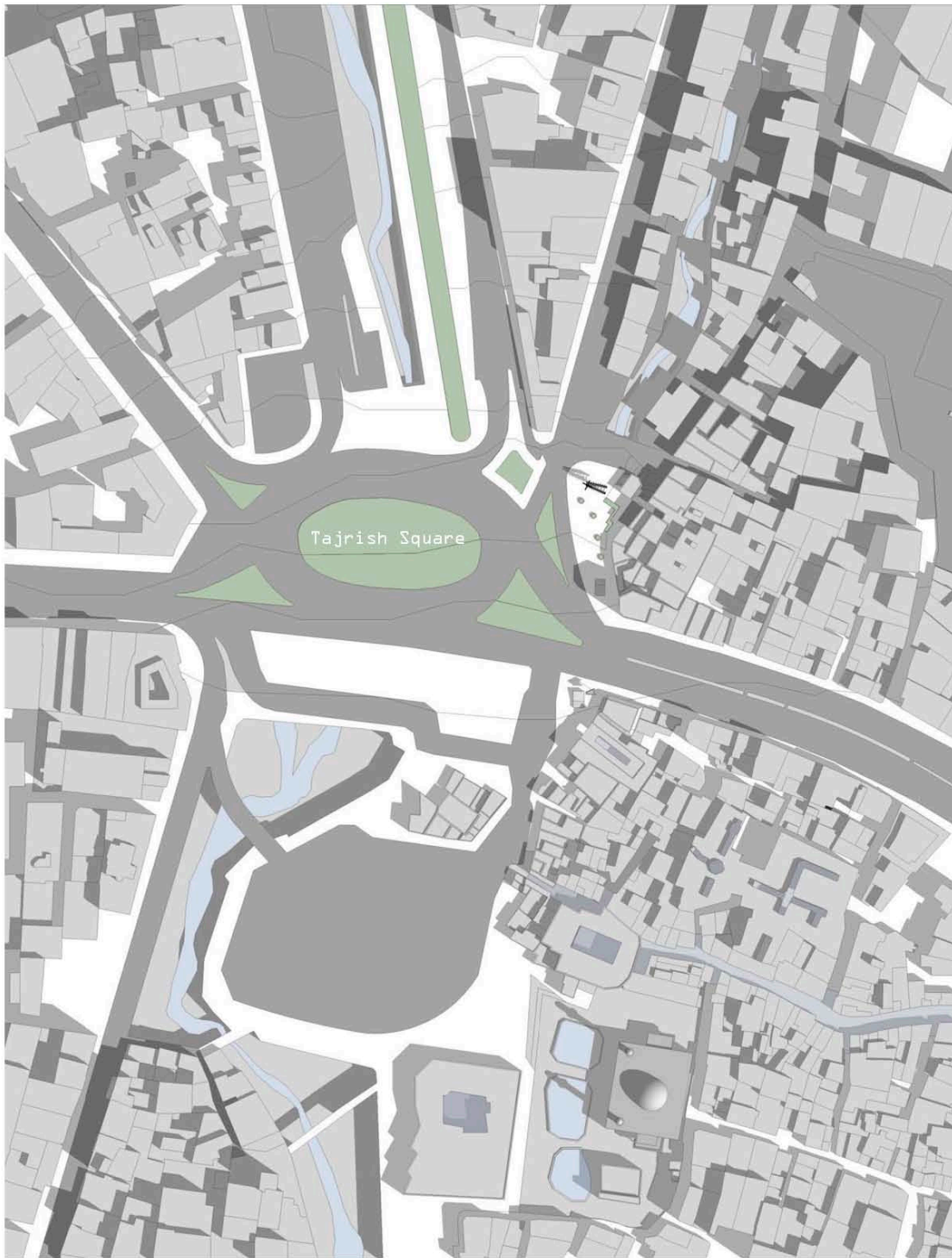


Figure 25 Tajrish Square and its surrounding buildings, roads, and natural environment. [Image provided by author]

The selected site for this project covers an urban zone located at a square in the Shemiranat County in the most northern region of Tehran. This zone deals with a number of issues such: as extreme building height deviation, use of the building façade for advertisement and signage, lack of green space, lack of organization in both traffic and pedestrian movement, lack of a secure street crossing system, unclear access and entrances, as well as available land for development. The goal of this project is to incorporate a skin system through which most of the issues existing in the selected zone can be to some extent addressed and resolved. For this part of the chapter however, only the site and its surrounding will be introduced.



Figure 26 Plaza in Tajrish where restaurants are centered [image provided by author]

Tajrish Square is a city square in Tehran that has been somewhat organically shaped as a result of the existence of urban generators such as a mausoleum, then a bazaar, and then the traffic circulation. It is a city center within which a great deal of advertisement, entertainment, commerce, religious activities, and traffic takes place. Consequently newer developments through which the performance of these activities can be enhanced have become quite necessary. Over the past few decades after the revolution, a large number of plans have been generated through the many different mayors who were to deploy them in this part of the city; however, none have been cheap or perhaps speedy enough for any major initiation to be taken. The government of Iran has lacked the both the organization and the financial requirements to exploit any of the developed schemes for Tajrish up to this day.



Figure 27 Vacant building awaiting its demolition [image provided by author]

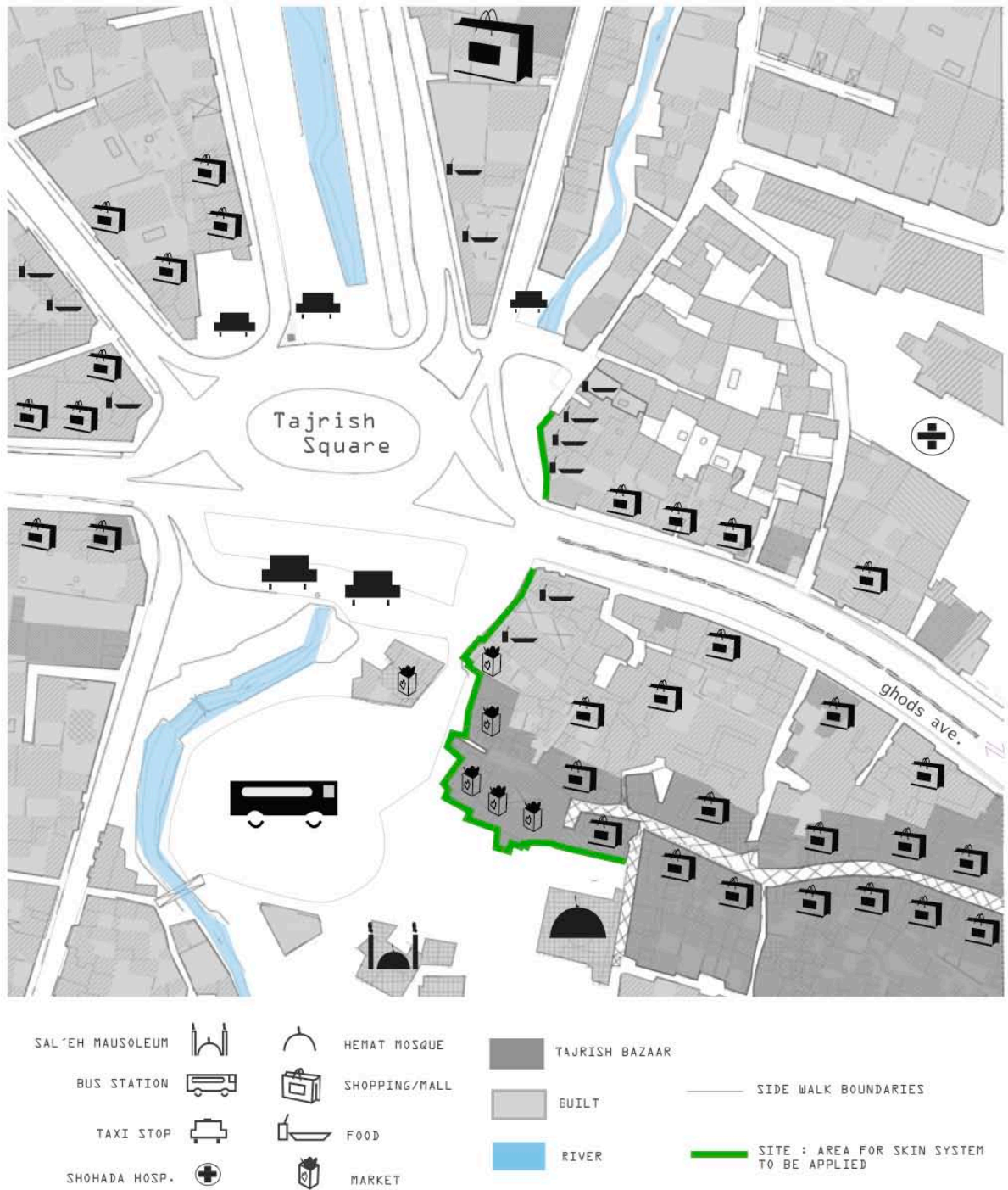


Figure 28 Tajrish Square zones and activities [image provided by author]

The purpose of this thesis would be to help initiate a skin system through which the historic character of Tajrish is temporarily preserved while a modern veil that is in many ways economical helps to organize the area. This system focuses on a selected zone (as shown in the image above), and

seeks to resolve issues such as access, safety, circulation, automobile traffic, incompetent signages, dull zone activation, as well as enhancement of the natural surroundings. At the same time that the system seeks to be energy efficient and green, it also works to add aesthetically to the character of the modern yet historically valuable Tajrish Square. Similar to the contradictory culture of Iran, the green veil will inexpensively conceal the reality of the undermined historic region of Tajrish and replace it with a striking exterior instead.

Tajrish Square

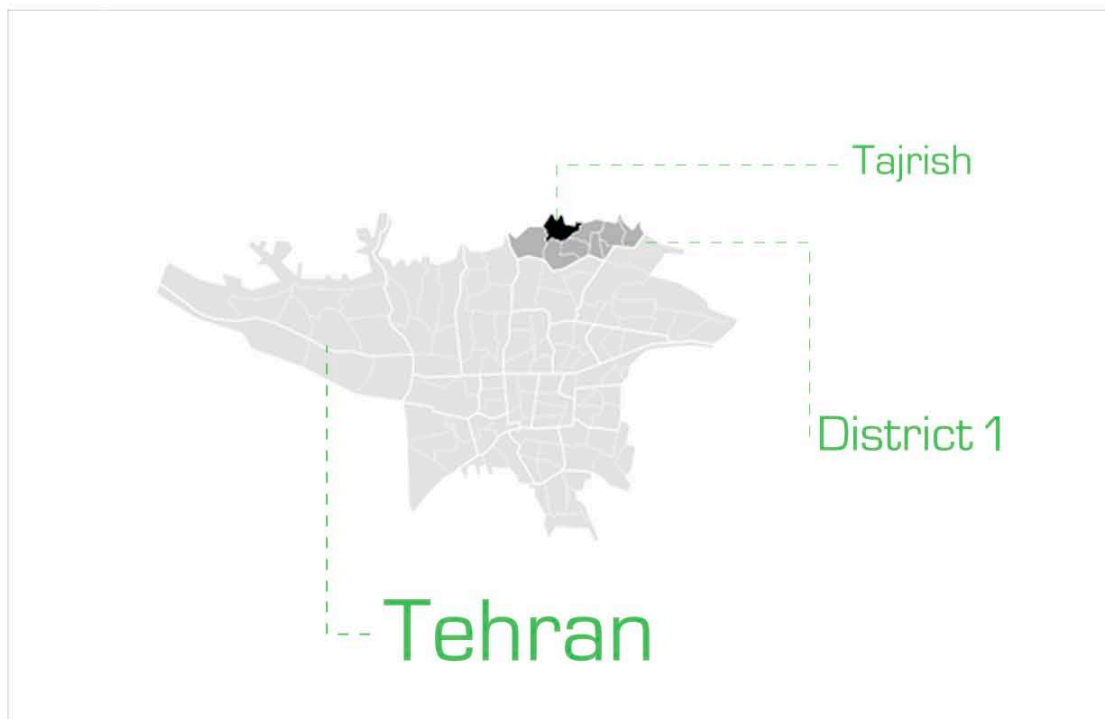


Figure 29 Tajrish area located in the most northern part of Tehran, within District 1 [image provided by author]

Tajrish is a neighborhood located along the northern edge of Tehran in the county of Shemiranat. It is considered to be one of the oldest parts of Tehran and recently has become more popular among the high-income due to the lower levels of air pollution in the region. The neighborhood's name takes its name from the forgotten Tajrish Bridge and the now famous and traffic dominant Tajrish Square.



Figure 30 District 1 & Tajrish Square [image provided by author]

Tajrish and the Shemiranat district (district 1) in the north of Tehran were at one point small towns that were used mainly for recreational purposes by the city residents until the early 1970's. Tajrish was therefore somewhat disconnected from the city's urbanized heart however, because it was so easily accessible it became a popular gateway for Tehran's residents. Later however with the city's population growth and sprawl, the neighborhood became a very dense region and became an important part of the city. As a result of the natural sprawl towards the Tajrish region, much of the buildings, streets, and alleys are the result of random dividing and selling of large plots of land that were once used for recreational getaways.



Figure 31 The natural sprawl: lack of parking space and tight alleys [image provided by author]

The story of Tajrish begins with its natural aspects and qualities. The two rivers of Golabdaré and Darband join one another to form the Maghsood Beig River. At this junction is where the Tajrish Bridge was constructed. With the

expansion of the city by the 50's the Bridge had become a square and slowly began to become filled with buildings, automobiles, and expensive housing. The Tajrish Square from its early points of development was the part of town most Tehranis were always anxious to visit. As it provided its visitors with beautiful mountain views, comforting temperature, as well as plenty of entertainments such as foods, snacks, and street performances. With the addition of the Tajrish Bazaar and the pre-existing Saléh Mausoleum it did not take long for it to become a major point of interest and for it to attract a large number of the well-established to begin to take residence there.

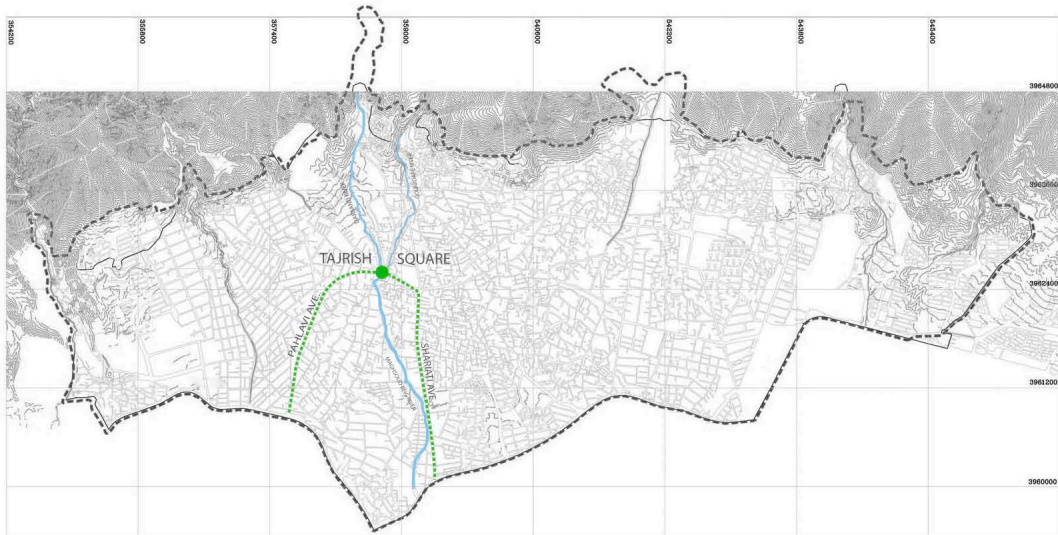


Figure 32 Tajrish Sq. and the rivers and avenues leading to it [image provided by author]

Today, Tajrish has become not only a major point of attraction, but also a major traffic hub where unruly traffic is a major issue. Crowds from different parts of the city come to Tajrish using the Tajrish taxi lines, the private taxis, the Tajrish buses, and the soon-opening Tajrish metro station in order to shop from the Bazaar, the modern shopping malls, or to visit the Mausoleum. It can be said that the Tajrish Square of today has lost a great deal of its identity as a bridge and a celebrator of the mountains and the river and has instead become a crowded city square where nature is simply hidden beneath the chaotic city buildings. Tourists and visitors still visit Tajrish for its lost fame however the quality of urban spaces in this region is lacks a great deal.

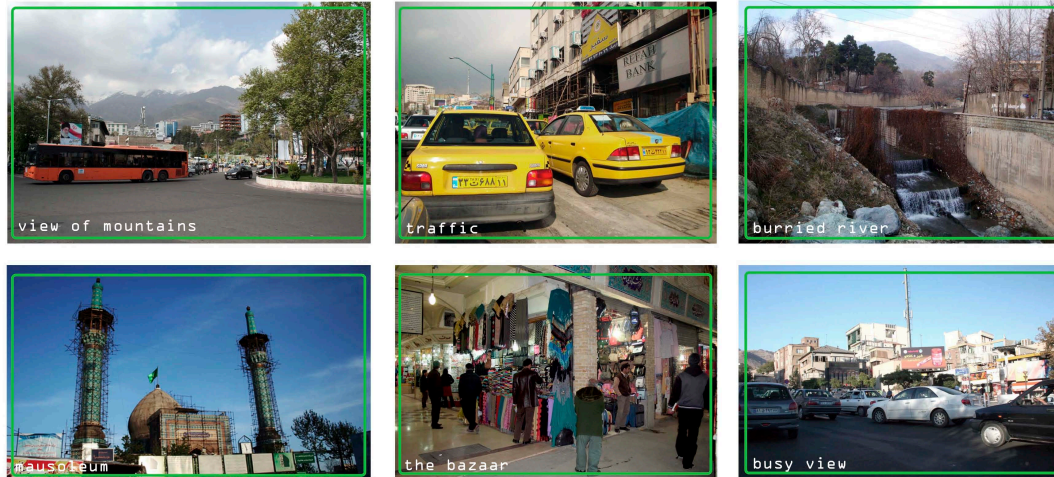


Figure 33 Tajrish Sq. and the rivers and avenues leading to it [image provided by author]

Although the major bus-station in the south of the Square, as well as the disordered human and automobile traffic, as well as a few other issues the site has have taken a way much of its potential urban quality; Tajrish has still remained a lively city center. Throughout the year, the square takes different festive masks ranging from cultural, to political and religious. Every year in March for example, the square is filled with flowers, flower sellers, street vendors, shoppers and crowds preparing for the Persian New Years' day, which is on the 20th. The Persian New Year that corresponds to the location of the sun and the precise start of the spring season. It celebrates freshness, health, nature, and is followed by renewing ones attire and spring-cleaning. It is during this time that Tajrish is still found at its best, as it becomes one of the liveliest places in the city. The mourning month of Moharam, which relates to the death of an Islamic Prophet, is also another period when Tajrish is covered in black and a large number of mourning parades take place on the avenues leading to Tajrish and into the Mausoleum.

Old and uneven buildings, disorganized pedestrian and traffic circulation, beautiful mountains, a hidden river, a grand bazaar, a sacred mausoleum, contemporary shopping boutiques, noise, air pollution, screams of vendors, the religious and the modern, the rich and the poor, the tourist, children beggars, and a structured chaos is about everything you find in this unique square; where you are constantly reminded that the clock is ticking and that life goes on.

Streets and Zones

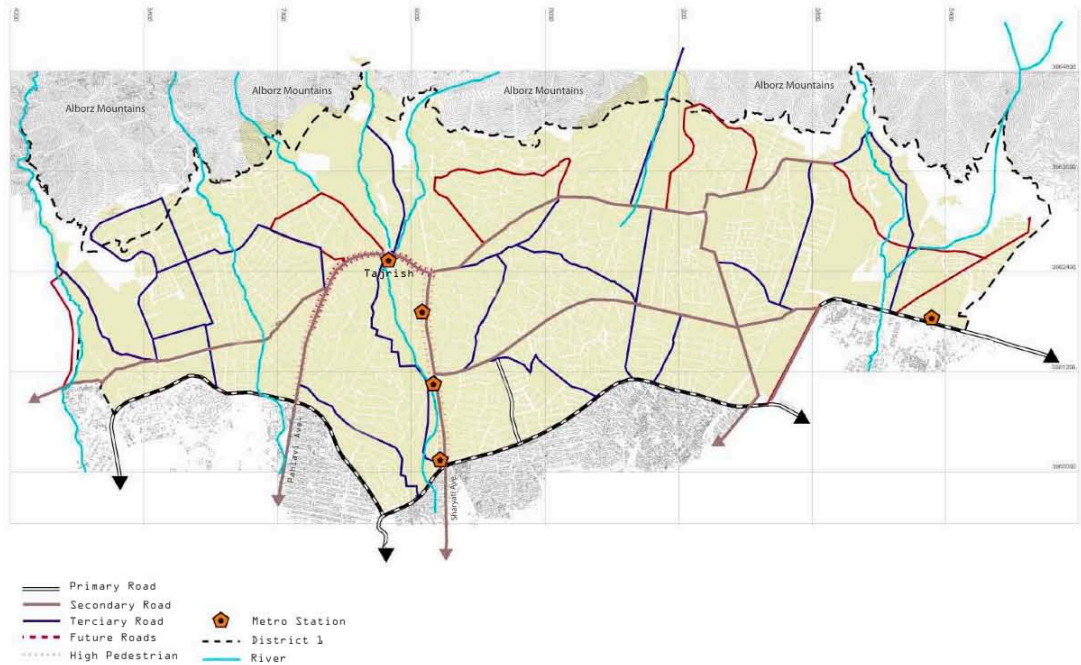


Figure 34 Metro stops and street hierarchy leading to Tajrish. The last metro station located at the Tajrish Square is currently under construction. [Image provided by author]

The major street that supports both vehicle and pedestrian navigation is Pahlavi Avenue. Pahlavi Avenue begins in the south and extends upward to the Tajrish Square located that was at one point the most northern developed part of Tehran. Pahlavi Avenue then returns southward as the paralleling Shariati Avenue that was shaped as a result of a natural flow in traffic. The two famous avenues come to meet one another in Tajrish Square, making the square highly congested. Wide sidewalks, and tall trees characterize the Pahlavi Avenue that was once the royal path to the Sadabad Palaces. Shariati avenue on the other hand, is a later extension of the other due to flow, and therefore not as eye-catching.

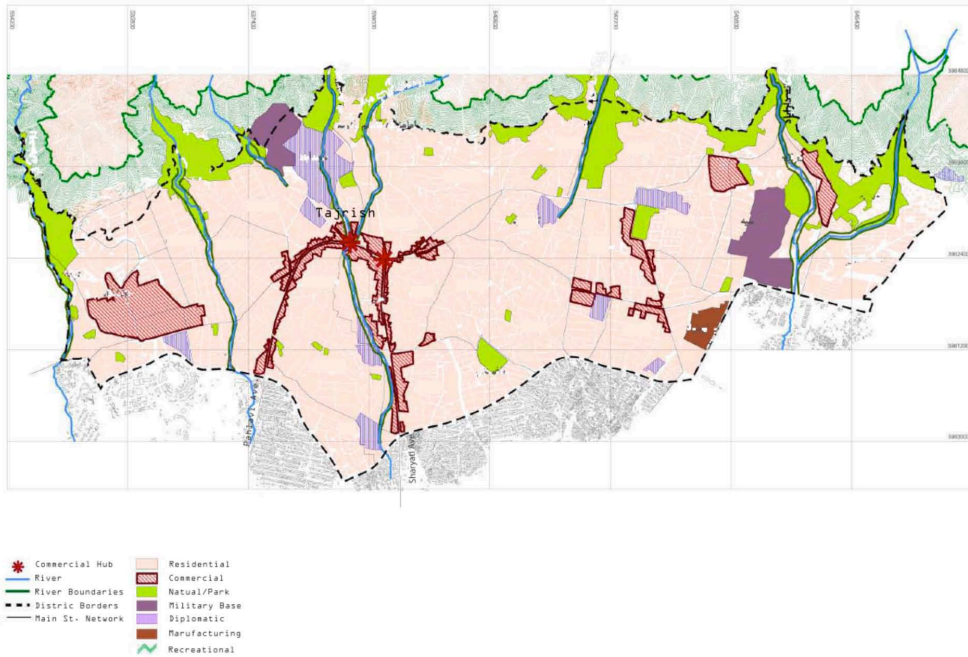


Figure 35 Congested traffic due to lack of an efficient street hierarchy in the Tajrish area of district 1 [image provided by author]

Highways and allies are other street types found in Tehran. The highway network can be found cutting through the old fabric of the city (especially in the south more poor regions) quietly ruthlessly. In both northern and southern extremes of the Tehran, narrow alleys that weave their ways through the old and modernized fabric can be found. These alleys and avenues (including Pahlavi and Shariati avenues) are characterized by tree lines and water channels which carry the water from the Alborz Mountains down through the slopes of city; and with them they bring sounds that echo the voice of the naturally intact city Tehran once used to be.

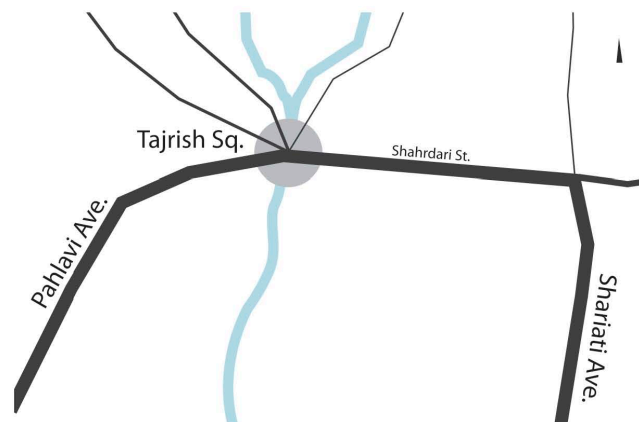


Figure 36 Simplified diagram of surrounding street-network in order of traffic congestion [image provided by author]

Tajrish Bazaar

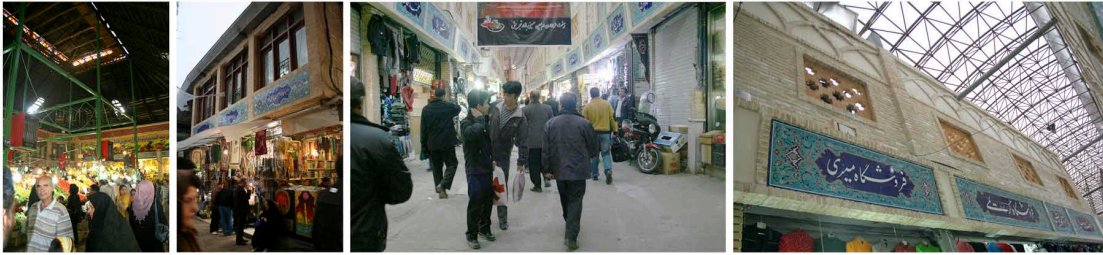


Figure 37 Photos of Tajrish Bazaar [images provided by author]

The Tajrish Bazaar is an organically formed and architecturally resembles the Grand Bazaar in the south. Upon entering the Bazaar's main alley the circulation becomes more difficult and physical contacts becomes a repetitive experience. The rich essence of the old bazaar begins to grow on its' visitors as all their five senses awaken in a short amount of time. The mixed fragrances of various spices, the smell of fresh fish, flowers, handmade copper bowls and plates, the sound of the shopkeeper screaming and advertising for his goods, and the softness and the roughness of the colorful fabrics in open display all and all create the wonderful experience of the Tajrish Bazaar. In a tight space where the flow of the various gazes constantly remind you of the passage of time, and the complexity of human life, the aged arches stand naively and still as the only reminders of patience.

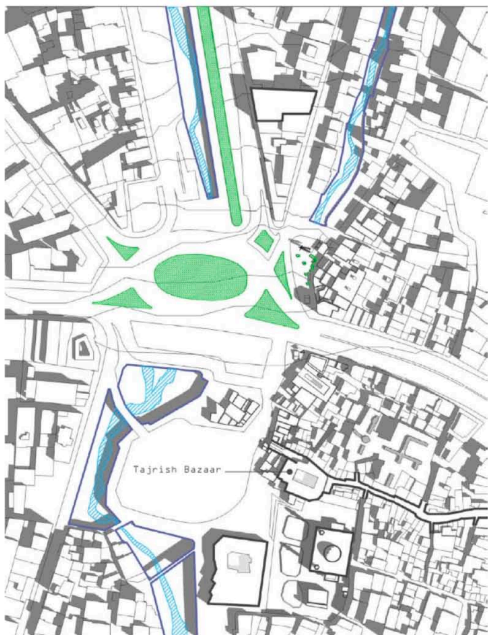


Figure 38 Tajrish Bazaar as it naturally weaves its way through the buildings and not only commercially activates the buildings along its main corridor but also the buildings and alleyways surrounding it. [Image provided by author]



Figure 39 Tajrish Bazaar has an environment filled with commercial, social, religious activities. [Image provided by author]

Tajrish Bazaar is the point of convergence between the rich and the poor, the religious visiting the mausoleum and the modern returning from his mountain hikes, the local housewife grocery shopping and the tourist examining with curiosity. It is literally a Bazaar of faces, cultures, and backgrounds; as well as a bewildering architectural. Although highly valued by most of Tehran's citizens and the visiting tourists, Tajrish Bazaar does not have an orderly appearance. This disorder, while can be considered, as the bazaars beauty becomes unpleasant at the visitors' main exist and entry point. A busy and polluted bus-station on one side, and an often-congested street on the other make the experience a bit irritating. This is a result of Tajrish Square's historic background as a transportation hub due to the bazaar and the mausoleum.



Figure 40 Class Divisions of the majority of people circulating and residing in the region. Notice the class drop as the Bazaar and the Mausoleum are approached. This also applies to a societal transition going from non religious, upper class shopping Mall to the more religious zone of the Bazaar and the Mausoleum. [Image provided by author]

Today, the circulation flow is mainly from the bus and taxi stations to the mausoleum, and then through the Bazaar. Although the sidewalks and pathways are uneven and busy, the outside air polluted by the busses, and the backgrounds diverse, Tajrish Bazaar has remained as one of the most entertaining places in Tehran for most of its residents. With the exception of the locals, the majority of Tajrish's daily visitors from various parts of the city tend to make their stroll through the Bazaar or its less traditional shops at least once upon their visit.

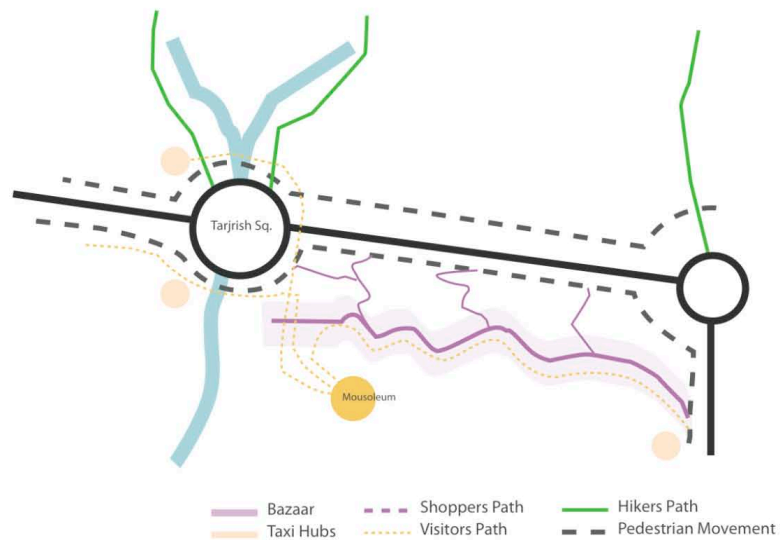


Figure 41 Pedestrian and visitors path from/to the Bazaar [image provided by author]

Tajrish Mausoleum



Figure 42 Salé Mausoleum: The religious section of Tajrish – currently being restored [image provided by author]

The Tajrish Mausoleum is a religious shrine as well as a mosque located in southeastern part of the square. A vast courtyard and a fountain that face the crowded and noisy Tajrish bus-station characterize the mausoleum. Females and males make separate entries to the shrine with the exception of the black veil required for females to enter. Although the shrine still has access alleys to the bazaar, they have all been irregularly blocked for security reasons and as a result making the building seem out of place. Every morning, noon, and at evening the call to prayer is announced from the Shrine's tall minarets reaching clearly the tight and the crowded alleys of the bazaar.

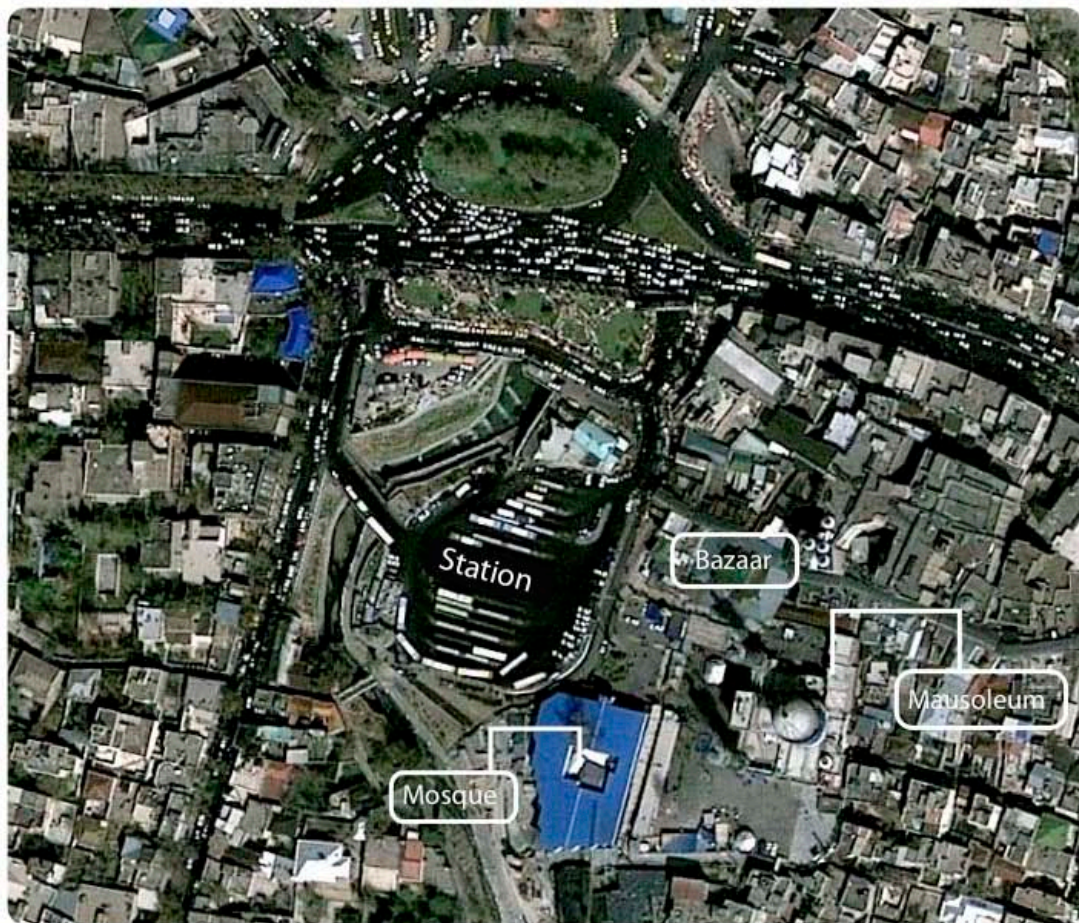


Figure 43 Specification of the Tajrish Mosque, The Bazaar, and the Mausoleum with its courtyard leading to the busy bus-station [image provided by Google Earth]

Site Problems

Uncontrolled Circulation



Figure 44 Tajrish Sq. traffic at its best [image provided by author]

Both vehicular and pedestrian circulation in Tajrish lack organization and order. This may be due to the convergence of many roads (including to major avenues) to one point as well as the unruly driving culture of Iranians. As a result of the disordered street traffic and the unsafe crosswalks, pedestrian bridges have become a popular solution throughout the city. Underground passageways can also be found at many major streets, yet they are not as appealing to the common jaywalkers in Tehran. Taxis and cars stopping at random locations is also another cause for creating disorder in Tajrish as people tend to make their way in between the vehicles to cross the roads and the vehicles vice versa.



Figure 45 [From Left] Class transition and an increase in pedestrian density can be seen from the up-scale shopping mall located on the north side of the side as it approaches the south side and the Bazaar. Also the unruly driving manners and pedestrians crossing in between traffic causing for more congestion is clear in these images. [image provided by author]

Nature

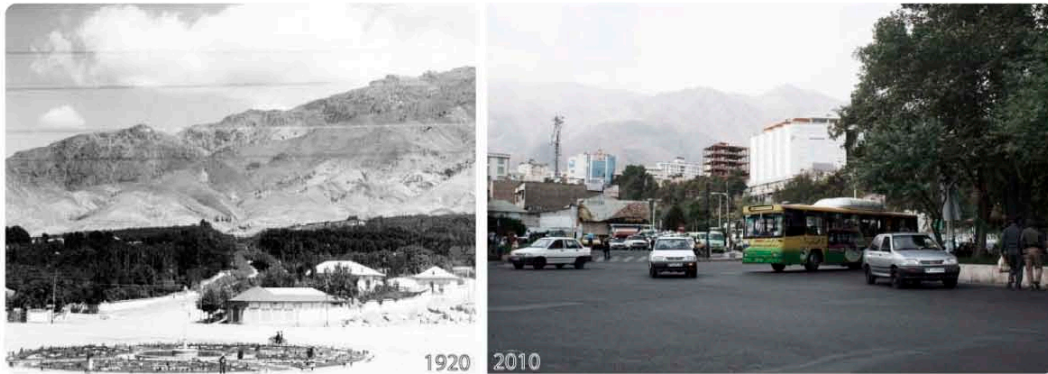


Figure 46 Tajrish Square in the 1920's as compared to what it has become today. A great deal of greenery has been replaced by tall buildings and the identity of Tajrish as a bride crossing a river is lost [Abrishami, F “Olden Tehran” – image on right provided by author]

Tajrish Square is located the merging point of the two rivers of Darband and Golabdareh. Having been at one point a mere bridge that crossed the two, today there barely any sign of the natural beauties of Tajrish that were once clearly evident. The mountain ranges of Alborz in the North, the roaring rivers, as well as their green surroundings have long been gone as a result of industrialization.



Figure 47 Tajrish within District 1, private, public, and semi public green spaces. A large number of the green spaces by the river are privately owned and inaccessible by the public[image provided by author]

Much of the valuable land along the river (to the north and south of Tajrish Sq.) has been privatized as a result of bribery and arbitrary zoning laws. While nature can still be seen and reached from the Square, it is barely noticed or appreciated. As the two rivers of Golabdareh and Darband reach the city the buildings and walls that have swallowed them lose their identities. Even though hikers and fans of nature begin their journey at the Square, little of nature is left here forcing a path to be taken through buildings and alleys until they have reached the city boundaries.

Pollution

Like the rest of the city of Tehran, Tajrish experiences severe air pollution. Also, due to the character of the square and its function as a transportation hub, noise pollution is another noticeable issue. As a result, a large number of the old buildings that have existed on the site for long periods of time have a layer of dust and filth that has been collected on the building facades. These buildings often tend to have double-glazed window systems in order to block out the noise coming off of the square, the bus-station, the cars, and the Mosque's call to prayer three times a day.

Municipal Orders and Architectural Issues

Aged buildings with worn-out facades surround the Tajrish Square this is a result of the city's zoning ordinances in the area, which has notified the owners about future municipal construction and road-work that will take place at some point in the future. These ordinances have been applied to the most parts of Tajrish, yet for too long, and as a result a large number of the buildings have simply aged, while remaining on hold for the past few decades. In addition, there is a historic aspect to this site, which includes the Bazaar and the Salé Mausoleum; both registered as historic landmarks. These issues have led to Tajrish's busy appearance that can be seen through its many uneven building heights, unorganized commercial signage and advertisements, as well as its depleted appearance.



Figure 48 Tajrish Bazaar: Restorations have included adding skylights and trusses, replacing the old brick facades, and the addition of the newer signs with Persian motifs

The site is also considered as one of the most popular and yet problematic regions of the city. Its popularity originates from the variety of activities and functions it houses, and its impenetrability originates from its natural sprawl through narrow streets that are now faced with severe traffic. As a result the municipality has promoted many years of investigations and urban design competitions by various firms in order to be able to better address these issues. The city's search for an idealized scheme for this site has gone through many phases; however no final scheme has ever been selected or applied to the site. This is due to two main reasons: one lack of sufficient budget to buy the required land from the owners, as Tajrish is one of the most expensive parts of the city and two, the historic aspects of the area. It is therefore, the purpose of this thesis, to create for a skin system, which can efficiently be added to the site in order to re-surface the existing fabric, while at the same time it can easily be removed once larger and more permanent plans can be applied to it.

Site Opportunities

Although there are many restrictions that have been placed on this site, there are also many opportunities for transitory development. Due to the historic aspects as well as the temporariness of the zone, small and feasible changes are proposed to be made to it. A few 1-story buildings that have little value, and are in bad shape, are proposed to be demolished. These group of buildings that are located by the bus-station are not only dilapidated, but are

also of little value. By riding the site off of these buildings a larger zone becomes available for the Skin system to be applied to the buildings and also, and also a plaza where various activities can take place.

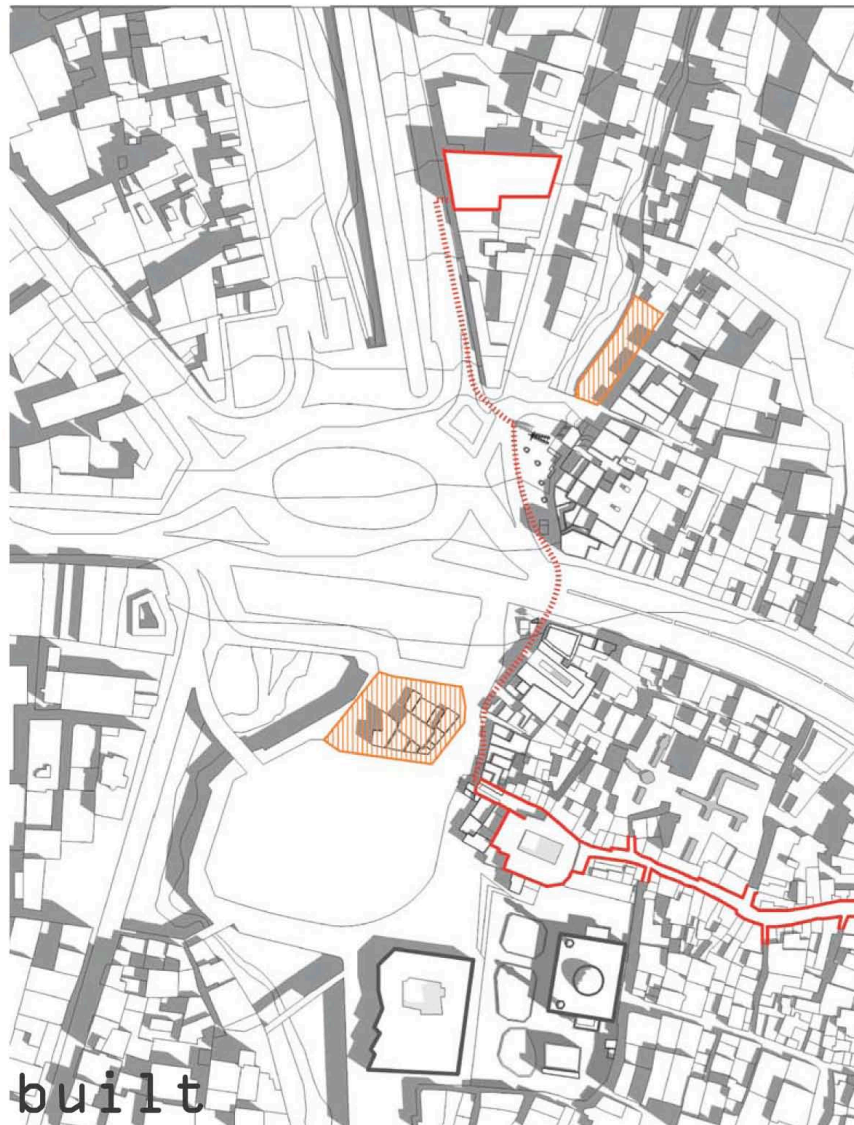


Figure 49 Existing Site Plan: The red line demonstrates the current path taken by pedestrians in order to access the bazaar from the mall. The hatched areas demonstrated buildings that are to be demolished [image provided by author]

Another area for proposed demolition is by the further up north, by the river. Although the municipality has proposed for the demolition of all the buildings along the east side of the river within the next 10 years, due to the temporal character of this thesis, only three of these residential buildings are being demolished. This zone allows for a park space along the riverside, which works to bring back the identity of Tajrish Square as the bridge that it used to be, and it also provides access to the long forgotten river.



Figure 50 Redesigned, proposed site plan allowing for the creation of an open plaza and separating the circulation of the buses to the bus-station from the pedestrians accessing the Bazaar and the Mausoleum. This minor expansion provides an ample amount of space for other activities such as resting, eating, greenery, and mere circulation that is quite congested in this area. The circulation path demonstrates the path most commonly taken by the pedestrians to and from the Mall and the Bazaar and into the Future addition of the Tajrish Metro Station. [image provided by author]



Figure 51 Building use along the selected future path of the connecting skin system
 [image provided by author]

Chapter 4: Cultural & Historic Influences

Isfahan & The Bazaar

A bazaar is a long and often narrow street with some or all roofed quarters where shops are embedded on the first levels of the buildings, side by side with interruptions along its way that leads to open and closed courtyards. Bazaars are often of three types depending on the period of time they are used for; they can be short-term, periodical, and permanent. The bazaar in Isfahan is a permanent bazaar, yet once it reached the very large Naqsh-e Jahan Square; the open space was at one point used for temporary markets.



Figure 52 [Left] An image of a *rasté* in the Bazaar of Isfahan, where light penetrates elegantly through the bazaar. These openings to the sky also encouraged the circulation of air and ventilation. [Right] Periodically held market at the “Image of the World Square” in Isfahan. [image provided by author]

The Bazaar of Isfahan began with two parts, the old and the new. The old part of the Bazaar began at the “Old Square” next to the Friday Mosque in the 11th century. Later, in 17th century, when the city of Isfahan was selected as the new Persian capital, a large new square called “The Image of the World Square” was built. A Two-story row of shops surrounded the square and led to a more regularly shaped and designed bazaar space. By the end of the century, the old bazaar, and grown through the city fabric and become connected to the new square and the new bazaar. This concept

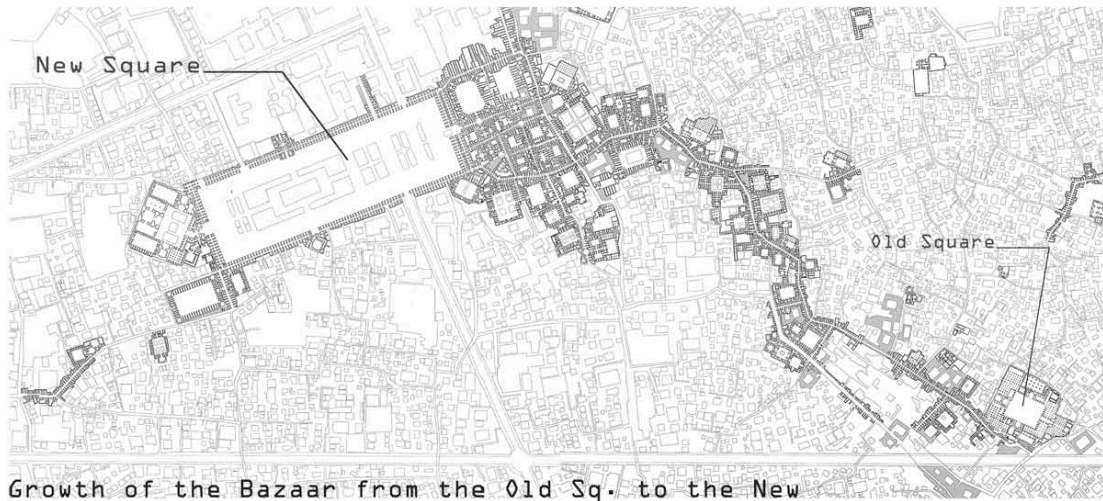


Figure 53 The Bazaar of Isfahan's growth through the city's irregular fabric from the old square to the new square. It can be seen how the regular shape of the new square both hides, and re organizes the irregular city fabric behind it and gradually transforms itself back into the irregular network of the Old Bazaar. [image provided by author]

Elements of the Bazaar



Figure 54 The four main spatial elements of the bazaar: The Timché, The Serai, The Mosque and the Rasté. [image provided by author]

A bazaar is a long and often narrow street with some or all roofed quarters where shops are embedded on the first levels of the buildings, side by side with interruptions along its way that leads to open and closed courtyards. Bazaars are often of three types depending on the period of time they are used for; they can be short-term, periodical, and permanent. Traditional Persian Bazaars are characterized by four main elements: The Rasté, The Timché, the Serai, and the Mosque. These four elements, with each contributing differently to the needs of bazaars, are seen in all Persian Bazaars of different types.

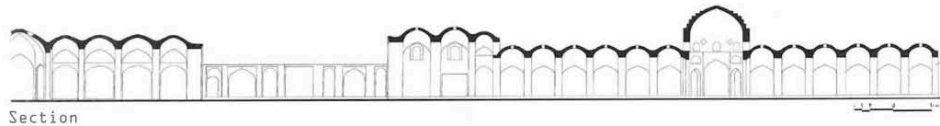
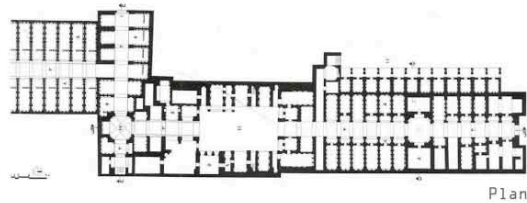
Rasté

The Raste or the main street is where the primary movement system of the bazaar forms a linear circulation that is mostly central. Often covered with

decorative domes, underneath it, an organized array of shops take place that are often following a 12' module. Along this path, which at times branches out to various rastés, there are often intervals or arched entrances that lead to Timchés, Serais, and Mosques. The Main rast'é (often noticeable by its width) begins at the main entrances of the bazaar and extends to a major square, a mosque or other urban spaces of importance. The rasté can also connect residential neighborhoods to the bazaar through a gradual disappearance of shops and the deformation of the rasté as it slowly diffuses into the city fabric.

Rasté

Zoroastrian Qaysarieh



Courtyard facade



Rasté main passage



Figure 55 The Rasté or the main street [image provided by author]

Timché

The Timché can be described as an economical complex where a series of shops, similar to the ones within the rasté (often larger), surround a covered “courtyard. Timchés often tend to sell specific products. For example, the “jewelers’ timché” would only have shops that sell jewelry products or fix jewelry. The “carpenters timche” would only have wood shops and workshops, where handcrafted woodwork is both made, and sold at the same time and at the same place.

Timché

Isfahan Bazaar

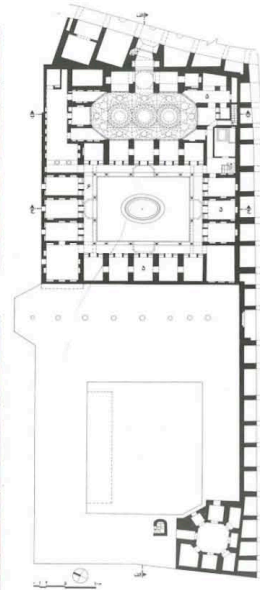
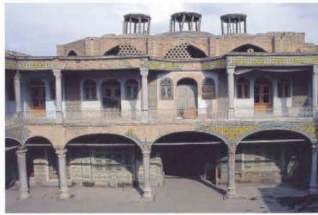
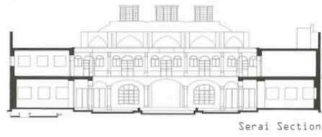
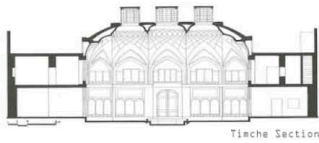


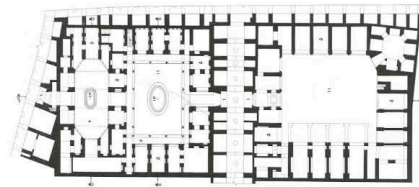
Figure 56 The Timché or the covered courtyard [image provided by author]

Serai

Serai means “house” in Persian. It was often used as guesthouse for traveling merchants. An open courtyard space with a two-storied complex surrounding it allowed the temporary residence of the merchants and the open courtyard was where horses and camels stayed. The serai space later found its way into the bazaar network and became an important part of the bazaar. The serai, like the timché is connected to the bazaar’s rasté.

Serai

Malek Timché & Serai



Plan



Figure 57 The Serai or the open courtyard [image provided by author]

Mosque

Bazaars are often big, and cover large areas of space; this leads to bringing most of the public amenities of towns near the bazaar; including the mosques. Bazaars often tend to originate near a mosque and extend further into the city. That is why most bazaars tend to have a network of smaller mosques embedded within them and often have a the largest and most prominent of the mosques in the city attached to them as well.

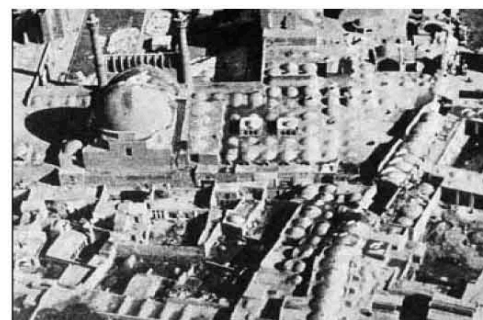
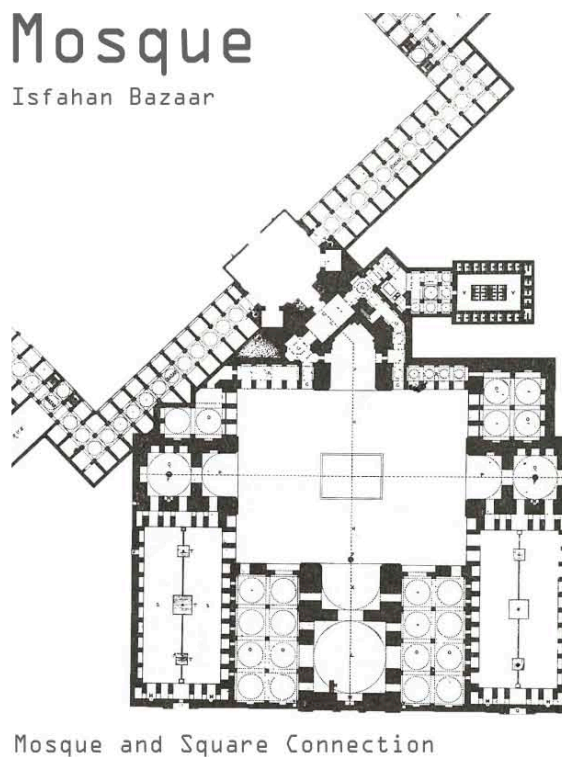


Figure 58 The Mosque as a key element of the Bazaar [image provided by author]

Persian Patterns & Influences

Persian Architecture uses a great deal of symbolic geometry, where pure forms such as squares, circles, and triangles begin to form patterns that are more complicated than those simple forms.

Influences from Site



Figure 62 [From Left] Pedestrian Bridge; picnicking at the Tajrish traffic circle due to lack of an open space in the area; the modular rhythm of the existing Bazaar; use of fabric to create for shading and blocking sunlight into the west-facing shops [image provided by author]

Chapter 5: Design Concept

The design concept for the skin was that it would have aesthetic benefits, sustainable benefits, social benefits, and economic benefits.

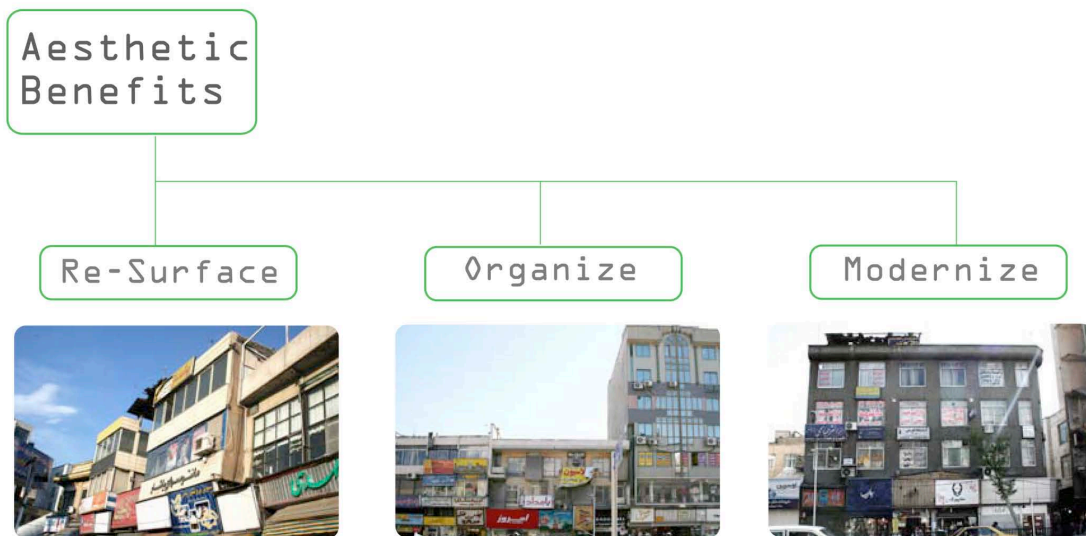


Figure 63 Aesthetic design benefits [images provided by author]

Aesthetic benefits include using the skin to resurface, organize, and modernize. Aged buildings with worn-out facades surround the Tajrish Square where a new modern surface will make the space much more appealing to the eye while at the same time provide for additional activities beneath it. Varied building heights and rooftops to be put into order through making use of rooftops and re-surfacing in order to shape a gradual height change as well as spaces for other activities. Depleted buildings and depleted signs are to be replaced with orderly signage that is both more appealing to the eye as well as more coherent.

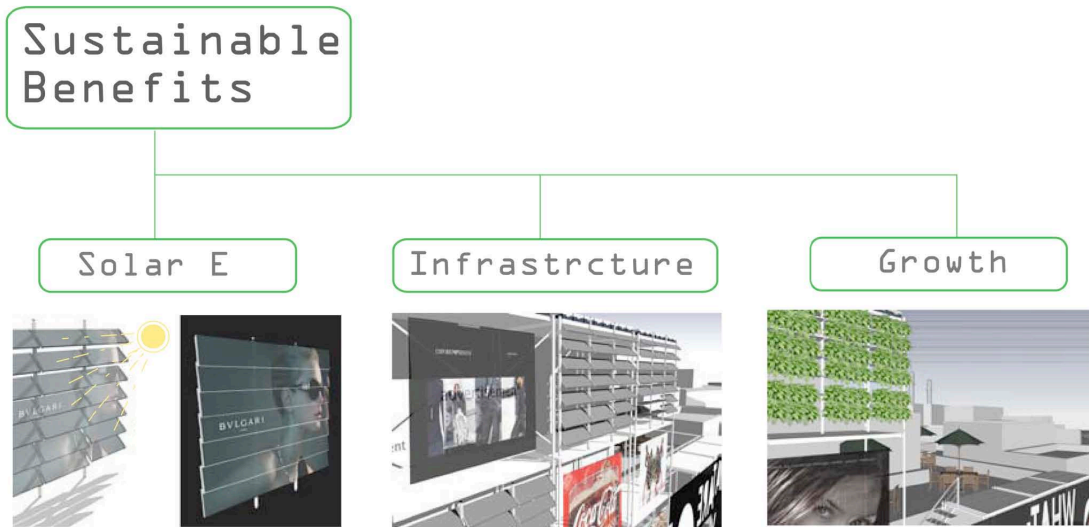


Figure 64 Sustainable design benefits [image provided by author]

Sustainable benefits include solar, infrastructure, and growth. Sustainable architecture, Recycling, and solar panels have just recently been introduced in Iran. There is also ample sunlight in Tehran, where the climate is dry. Solar panels will be able to collect the solar energy in order to make the skin self-sufficient. The solar power can be transformed to electricity during the night where Information can be transferred to the public through billboards. This makes for an efficient infrastructure where power cables and data lines get eliminated. The new skin system can also serve as the means to not only bring nature and growth back to the highly polluted region but also to act as the means to introduce green architecture to the citizens.



Figure 65 Social and cultural design benefits [image provided by author]

Social benefits include creating a cultural bridge, urban spaces, and a local identity. The cultural gap that exists from where the skin system begins to where it ends is quite large. This circulatory zone acts as a bridge through which the Bazaar and The Mall are connected to one another. This bridge will act both as a cultural as well as an economical connection. Through its path, the skin system provides for zones where pedestrians can rest, play, and eat. One of these zones is located along the once famous river that takes place within the designated path for the skin. Tajrish has always been known through its history, as the place for entertainment and dining. To return its local identity back, the skin system creates zones where activities such as dining by the street can again take place and have their designated spaces.

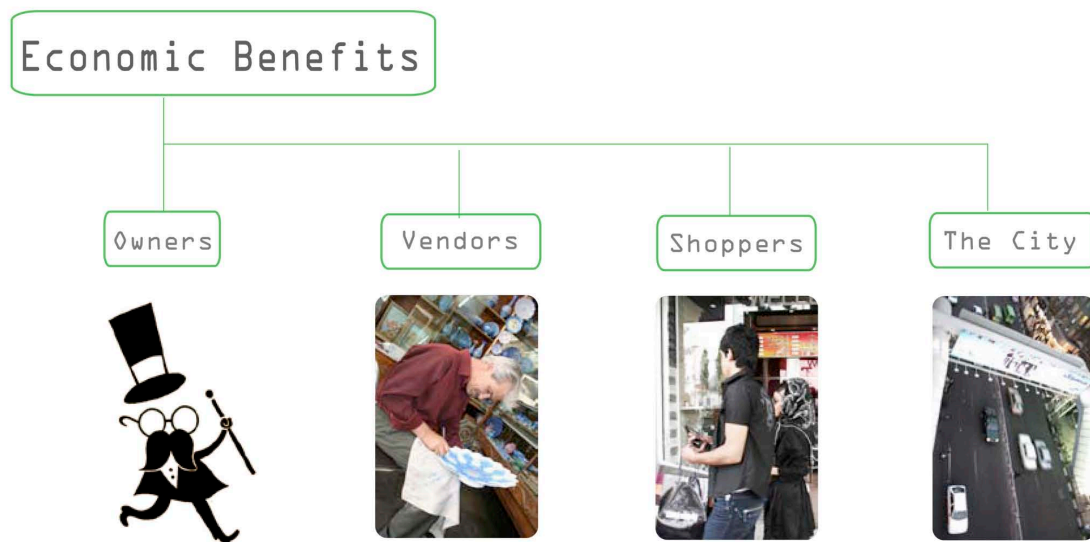


Figure 66 Economical Design Benefits [images provided by author]

Economic benefits include appealing to the owners, vendors, shoppers, and the city. The Owners will invest in the project for economical improvements made to their property through the city. The vendors will agree to invest in this project, as they will benefit from the traffic/ access/ advertisements brought to and for their store. The shoppers will use this system as the fastest and most enjoyable means to access the most prominent parts of the region. The city (the Mayor) will invest in this project for the benefit of the cityscape. Through levying revenue taxes on both the owners as well as the tenants, the city's investments will be paid off.

Chapter 6: Architectural & Urban Resolutions

Architectural Resolutions

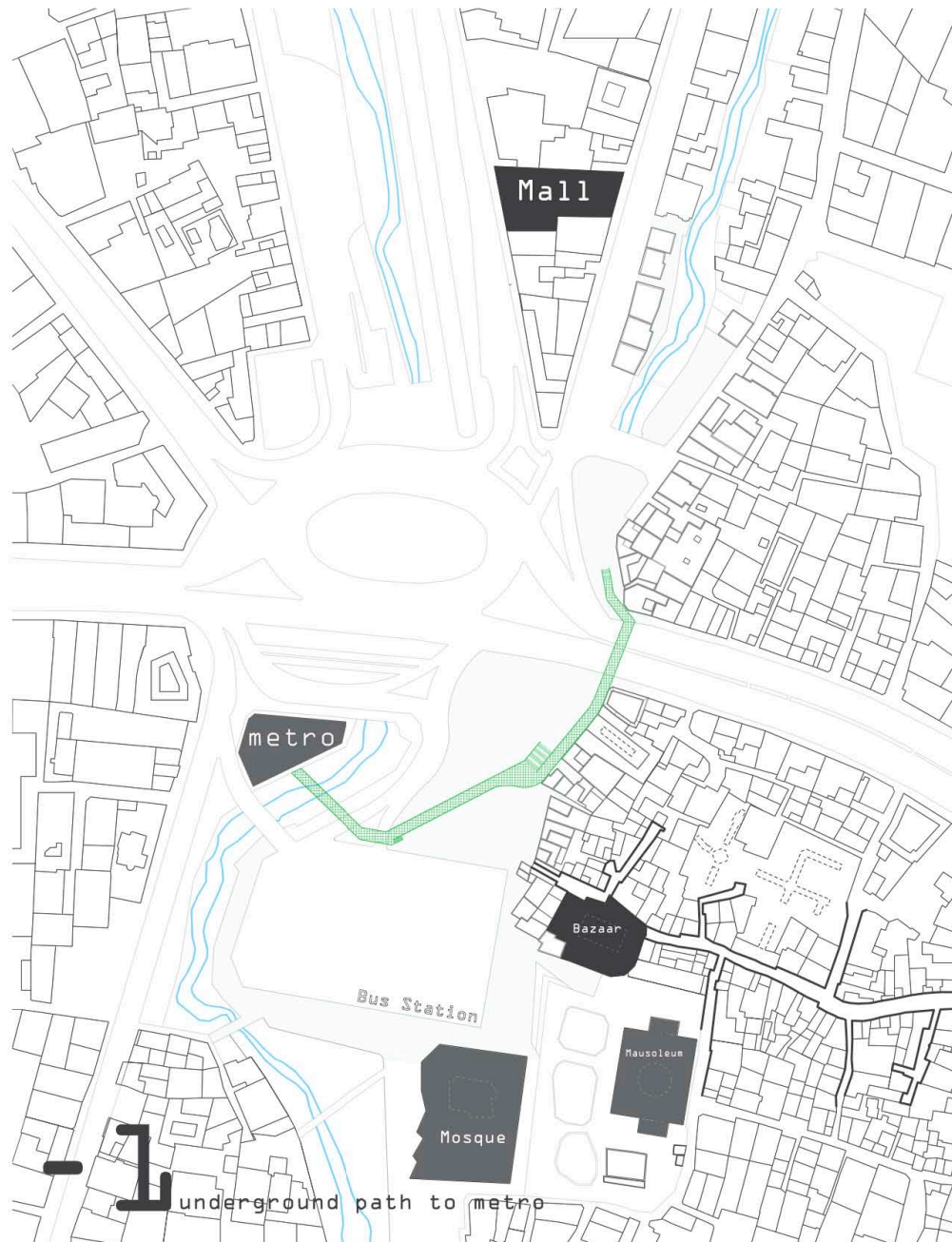


Figure 67 The underground path for the skin system to reach and allow access to. The underground pedestrian crosswalk currently exists, however with the addition of the new metro station, it is proposed that the access way reaches through, across the river, and to the metro station. This underground path, also adds a third level of circulation, helping to ease the pedestrian congestion on the site. [image provided by author]

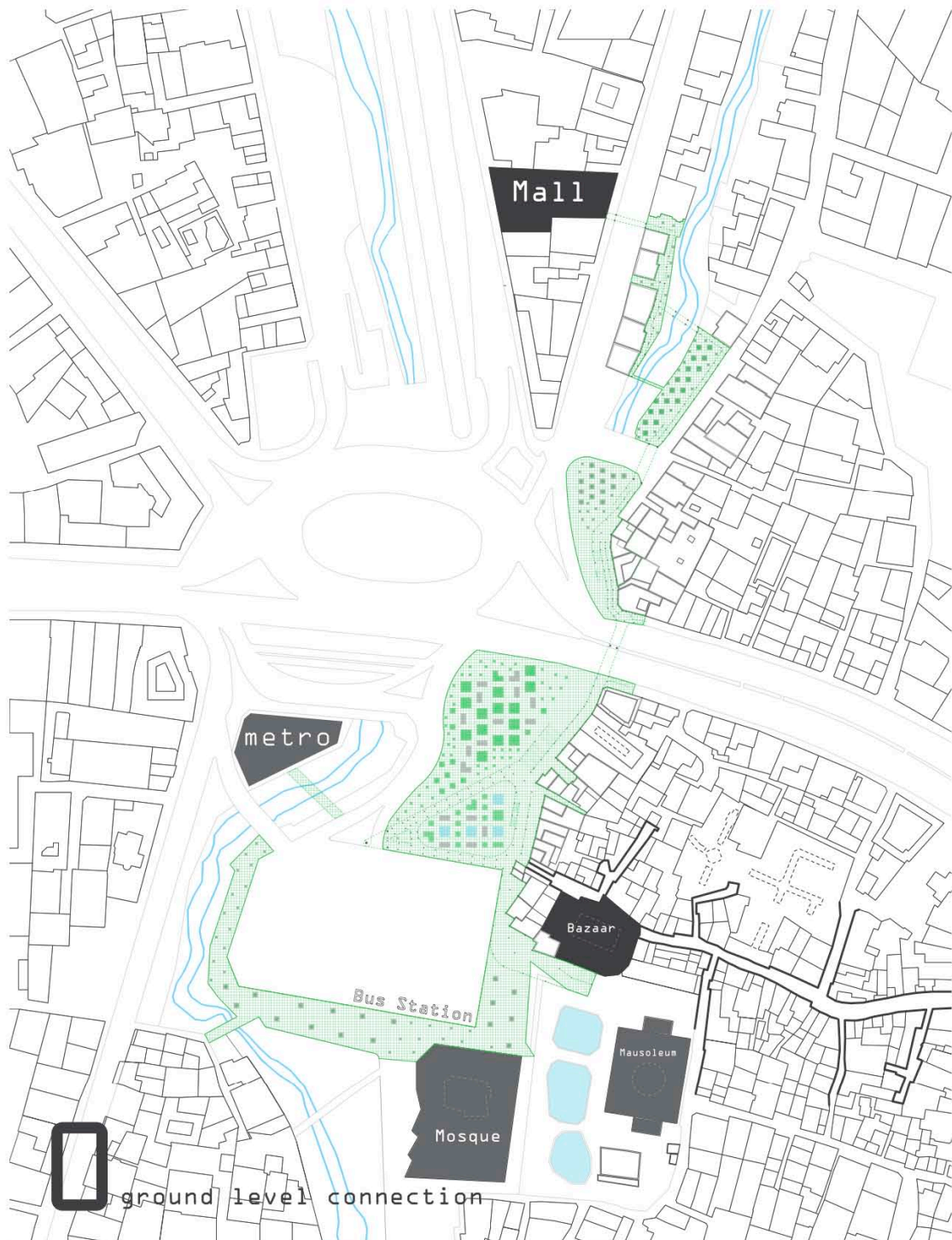


Figure 68 The influence of the skin and the proposed design at ground level. In this proposal a 3'x3' module of concrete tiles are laid out through the parts of the site influenced by the skin. This grid, with its modularity allows for temporary fabric structures to be assembled into it for the times of outdoor markets and other public events. An additional urban park space by the river also uses the same system, while at the same time it encourages growth, on a vertical skin surface, that also seeks to cover the old residences behind it. [image provided by author]

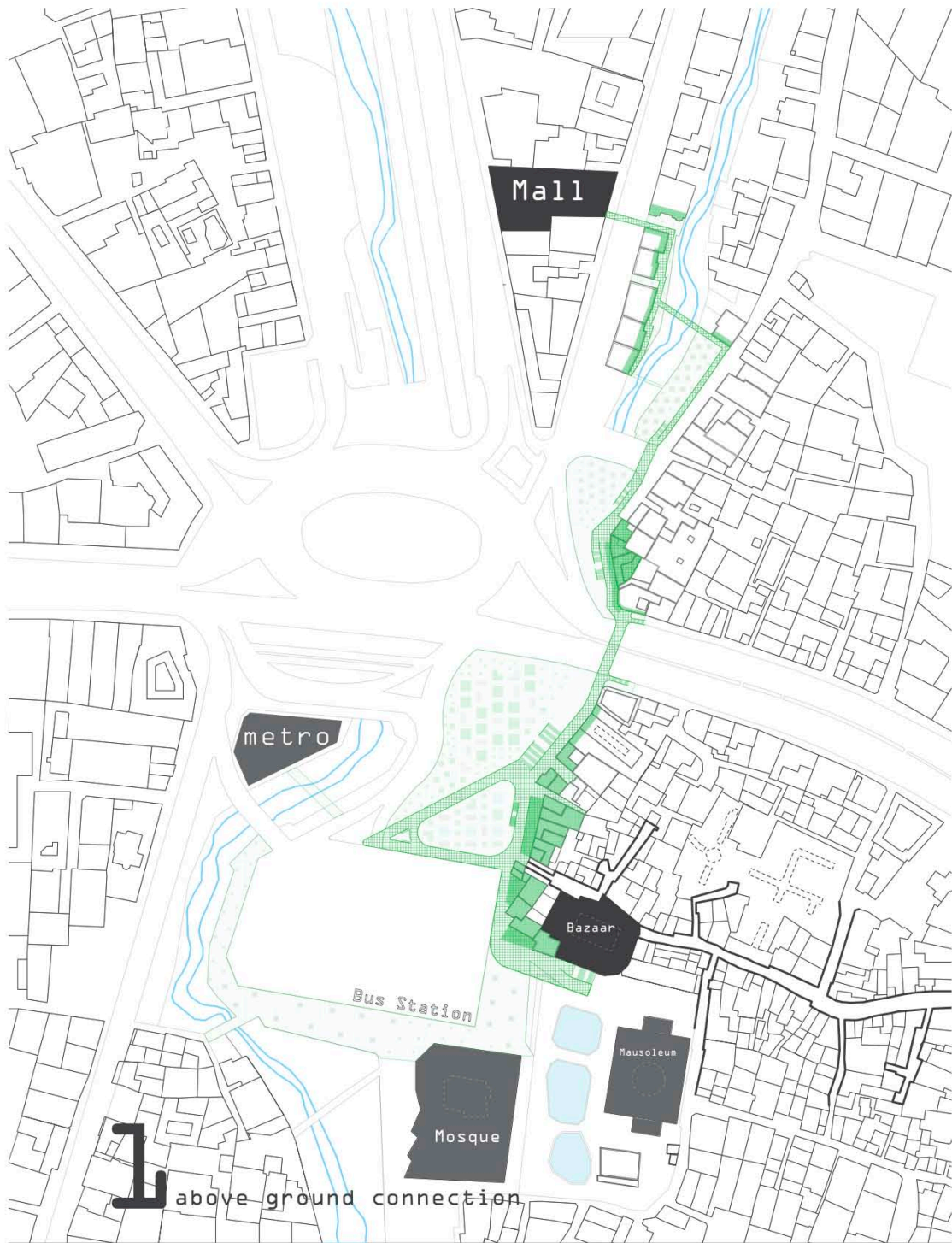


Figure 69 The actual building skin system's path on the site as it ties together the major urban nodes. Like the old bazaars, which grew organically through the fabric of the city, this temporary skin weaves its way through, lifting the access ways from the ground and at the same time activating commercial activity within the buildings that it reaches at three different levels: ground levels, mid-levels, and the rooftops. (Dark green represents rooftop coverage) [Image provided by author]

Structural Resolution

The addition of a new skin over the existing buildings in Tehran raised many issues when it came to the construction method of the system. How will it attach to the existing building? What will it be made of? Will it be a modular system or varied across its path? How will it adjust to the various edge conditions? The answers to these questions later defined both the nature of the skin as well as its form through a series of studies and processes that are not shown all in this document.

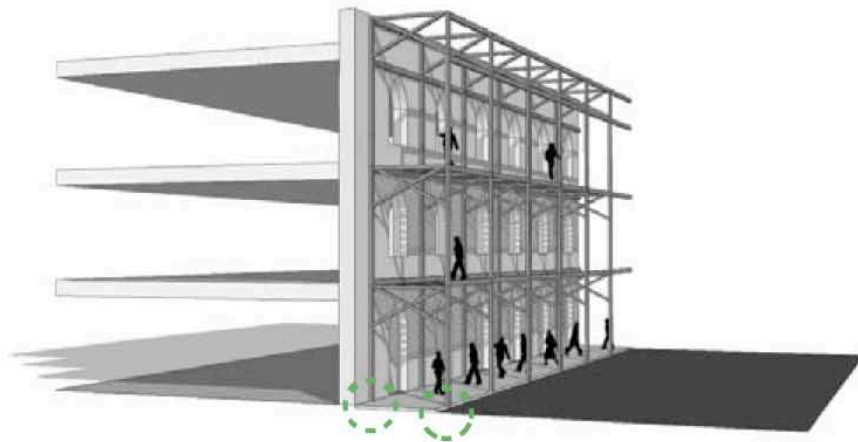


Figure 70 Independent from the structure the skin is applied to [image provided by author]

Initially there were three different options for attaching the skin to the existing building. The first option was to construct a self-supported structural system that attached to the ground. This system would be independent of the existing building and would have its own foundation. It would also be very similar to the way scaffolding is constructed.

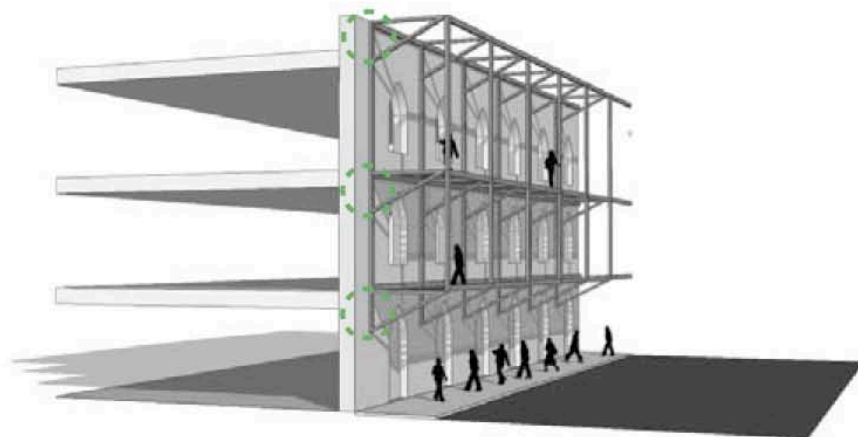


Figure 71 Skin would be attached to the existing building [image provided by author]

The second option was to attach the skin to the side of the building. Using a system similar to that used by exterior fire escape stairs, the skin would leave the sidewalk completely free for pedestrian traffic.

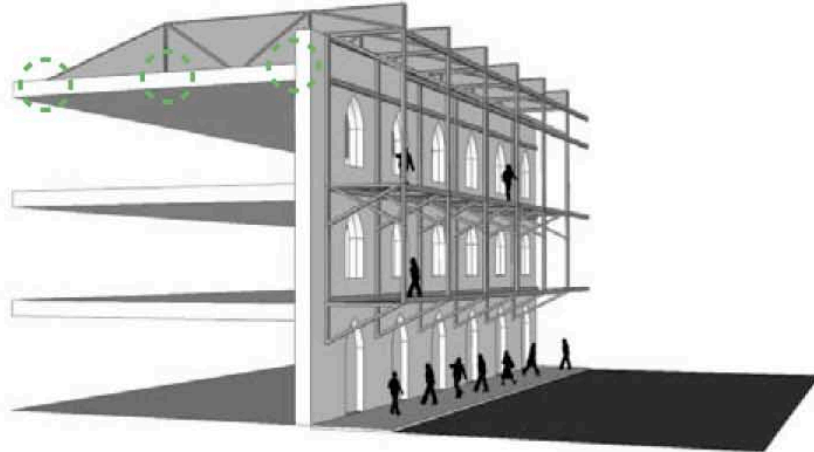


Figure 72 Skin would be hung from the existing structure [image provided by author]

The third option was to hang the skin from the roof. Much like attaching the skin to the walls, the skin would leave the sidewalk completely free for pedestrian traffic and at the same time activate the rooftop.

Finally the selected solution was the first option: a skin system that is to be self-supported where columns rest adjacent to the walls and support the skin and platform. Damaging the building as minimally as possible and at the same time leaving the structure flexible for rooftop use, as an option seemed to be the ideal method. This approach allows the skin to adjust to various buildings located around Tajrish Square. The skin itself has sustainable features, provides enclosure, allows for plant growth, and serves as advertising. This method, influenced by the various studies that have been mentioned through out the document, resulted in the design of a modular form that had cultural influences as well as a structural flexibility for various times of the year.

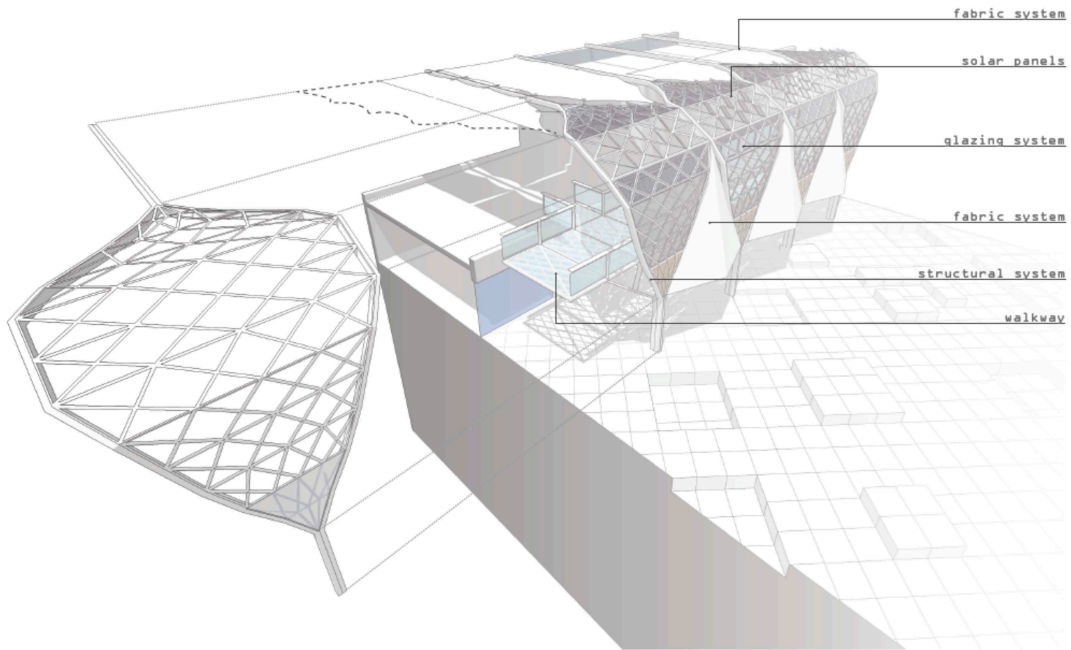


Figure 73 Skin Diagram of skin showing various components including fabric system, walkway, structure, glazing system, and solar panel system. [image provided by author]

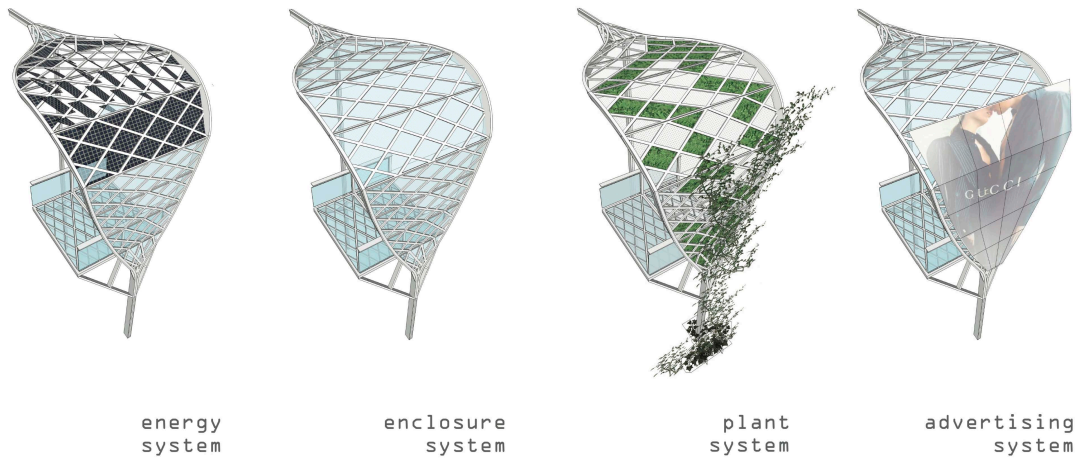


Figure 74 Various skin conditions including energy, enclosure, plant, and advertising systems [image provided by author]

Structure & Skin

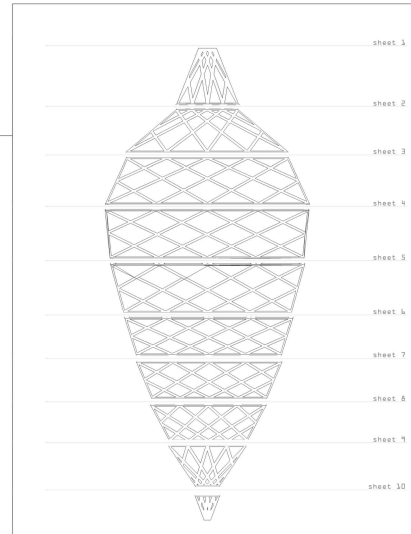
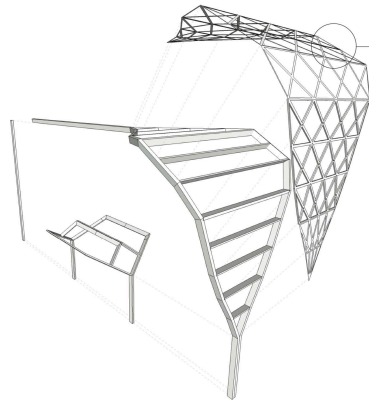
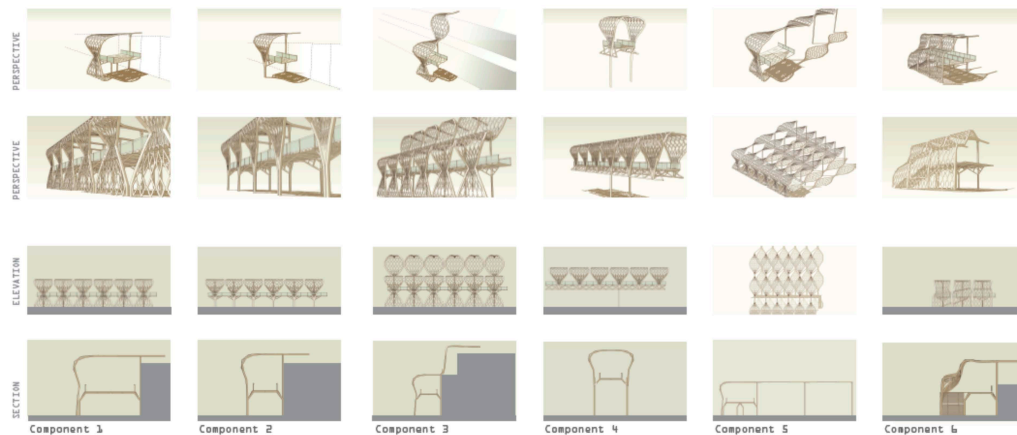


Figure 75 A typical bay of the final form and structure of the skin system that is both symbolic of Persian history as well as modernity. The system can be built in modules and assembled on site. It is self-supported and free of any dependence onto the existing buildings. [image provided by author]



Skin Design

Figure 76 Diagram showing various skin conditions. Component 1 allows the skin to provide both visual and physical enclosure to the ground and upper floor while creating a uniform height and rhythm to the various buildings. Component 2 allows the skin to provide both visual and physical enclosure to the upper floor while allowing movement through the skin on the ground. Component 3 allows the skin to adjust to changing heights of the buildings. Component 4 allows the skin to connect across the roadway while providing advertising opportunity. Component 5 allows the skin to extend deeper across the rooftop. Component 6 allows the skin to provide physical access to the upper floor.

Walkway

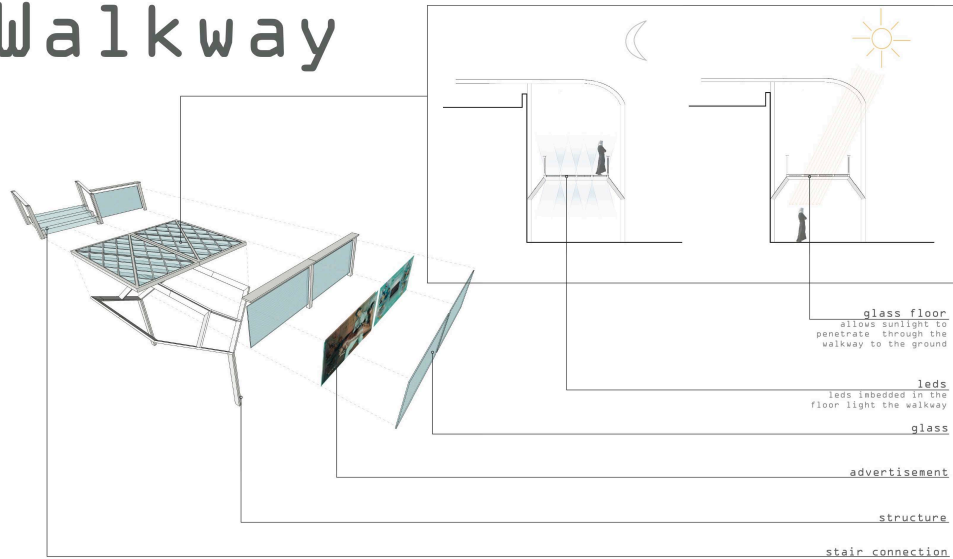


Figure 77 Diagram showing assembly of walkway. Sun penetrates through the day while the walkway lights up at night. The walkway provides horizontal movement through the skin as well as access to the roof. Modular staircases are used to facilitate movement to the varied roofs. The walkway is made of steel and glass with LED's embedded within. The LED's provides lighting at night. Sections of the glass walkway are clear allowing light to penetrate during the day. This references the historic rasté of Isfahan. The railing provides opportunity for advertising. [image provided by author]

Fabric

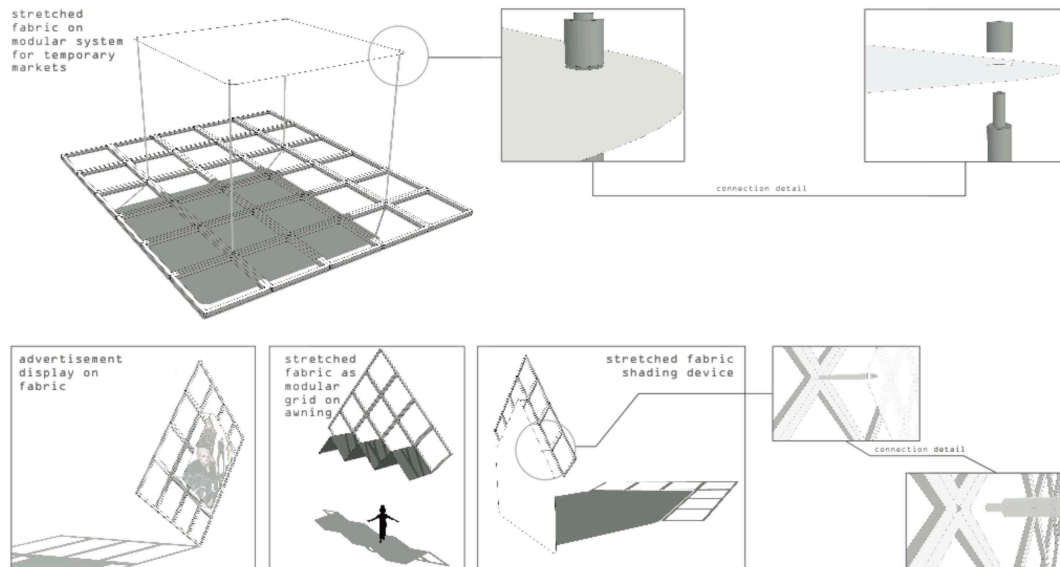
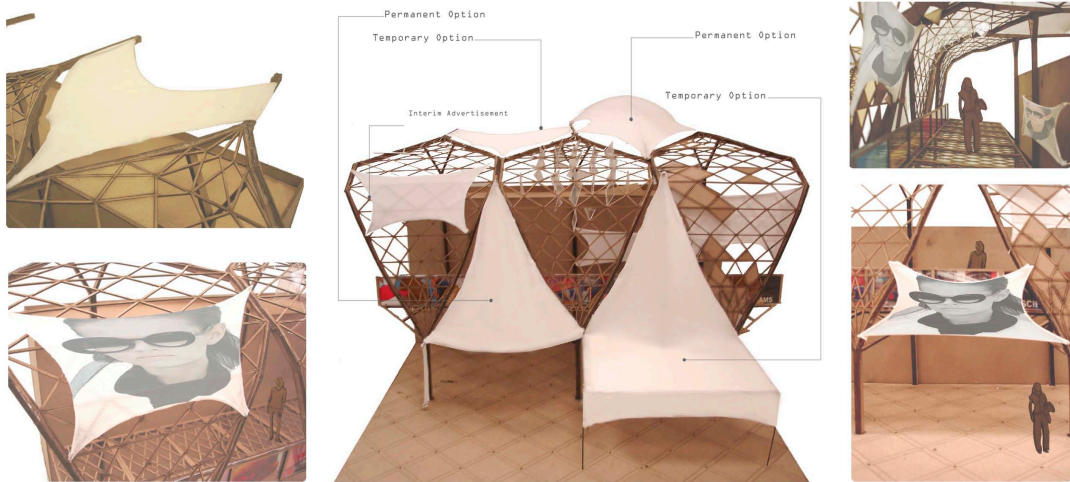
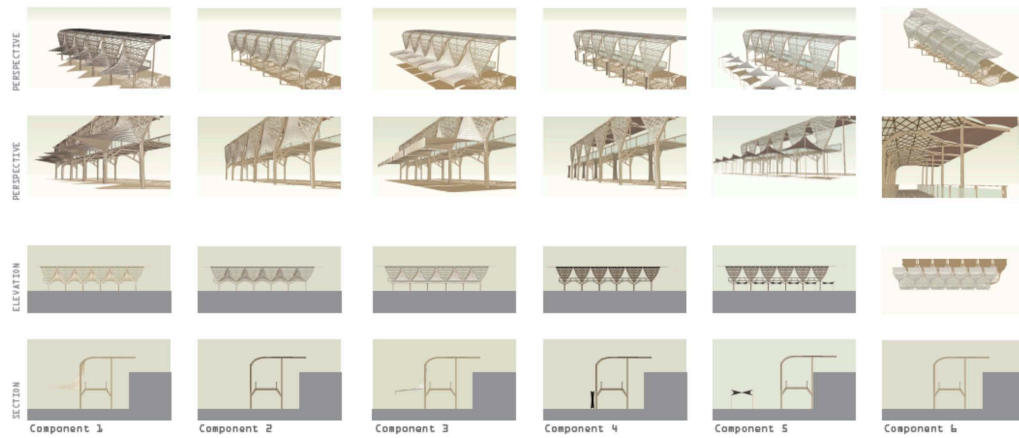


Figure 78 The modular system that works with the fabric in order to be used as a shading device, economical advertisement method, as well as field markets in the plaza. [image provided by author]



Fabric Studies

Figure 79 Studies on a physical model using the designed module and various ways to attach fabric to it for different functions such as restaurants on the rooftops, out door markets at the ground level of the skin, and advertisement on the skin. [image provided by author]



Fabric Design

Figure 80 Diagram showing various fabric conditions. [image provided by author]

Environmental Resolution

The surrounding environment impacts the skin by acting as a generator of built form while allowing the skin to become an active collector, store, and distributor of energy and water.

The skin is shaped in a concave form to direct water to its edges. The water is directed to the edges and collected and stored at the bottom of the skin in a

storage container. Water is then redistributed up the skin to and used to feed plants attached to the skin.

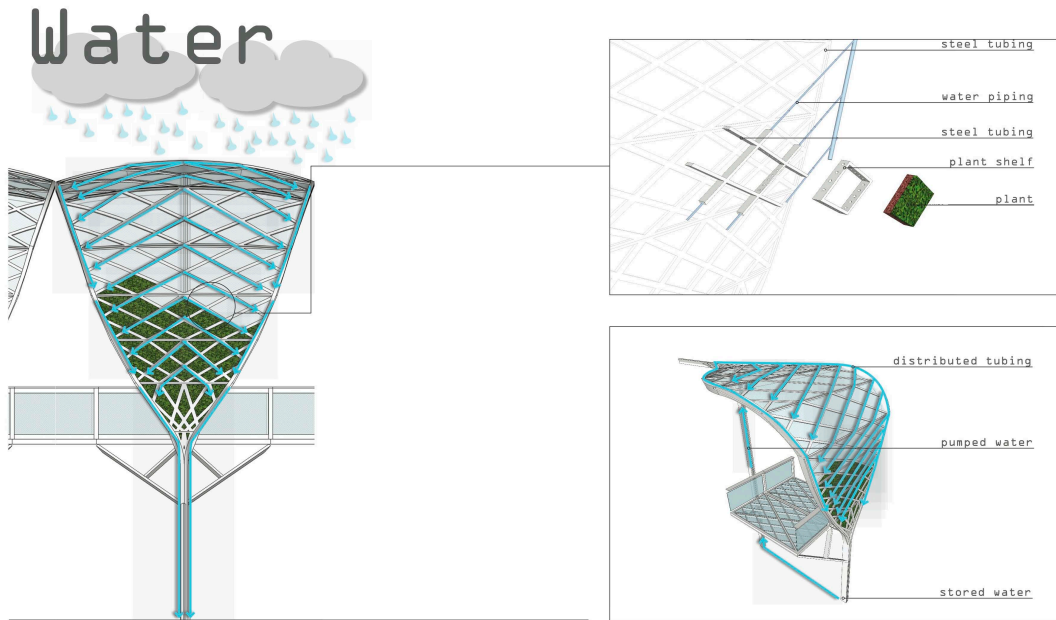


Figure 81 Skin as water collector [image provided by author]

The skin features solar panels, which collect and store the sun's energy. The energy is stored in batteries located at the bottom of the structure. The energy is redistributed at night to led's located in the skin. The LED's illuminate the skin and advertising.

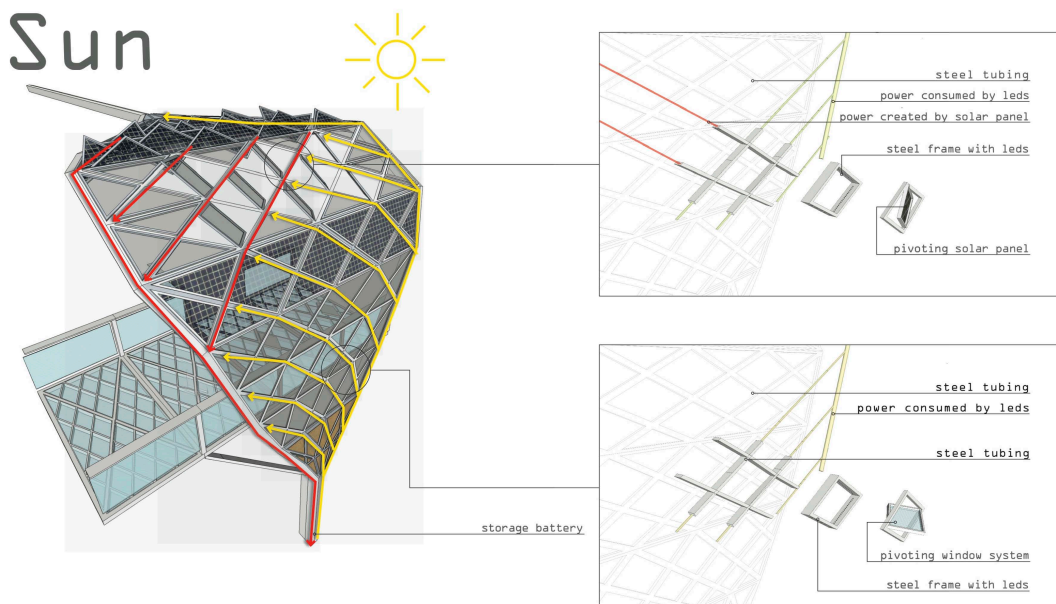


Figure 82 Skin as solar collector [image provided by author]

The skin is oriented in a north south orientation, which allows wind to ventilate it during the summer months. The glazing system opens to further facilitate the natural ventilation. The fabric on the roof is positioned to catch wind and direct it through the skin.

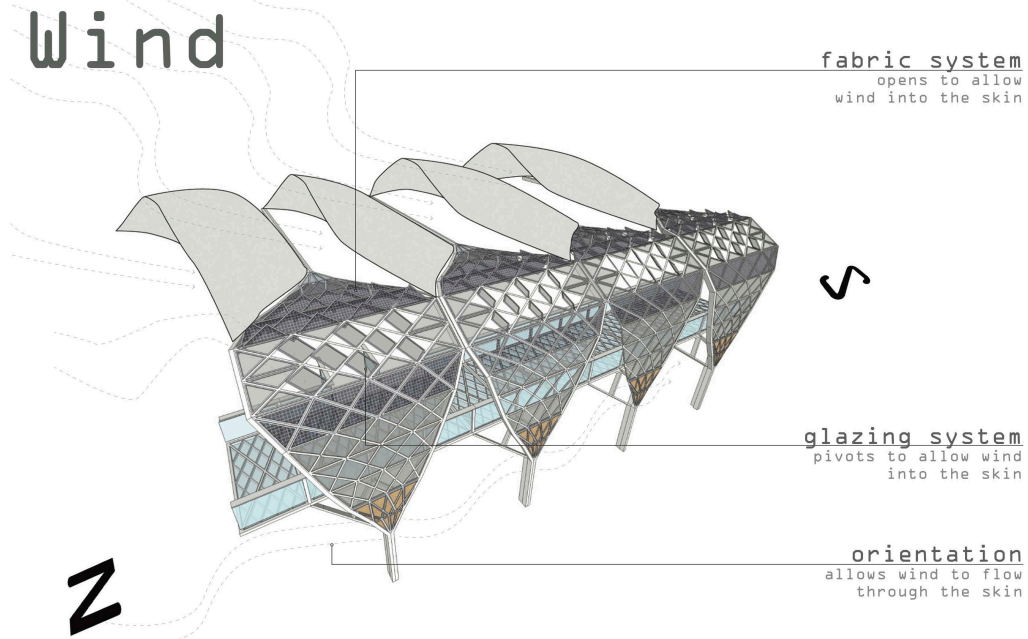


Figure 83 Skin as wind collector [image provided by author]

Urban Resolution

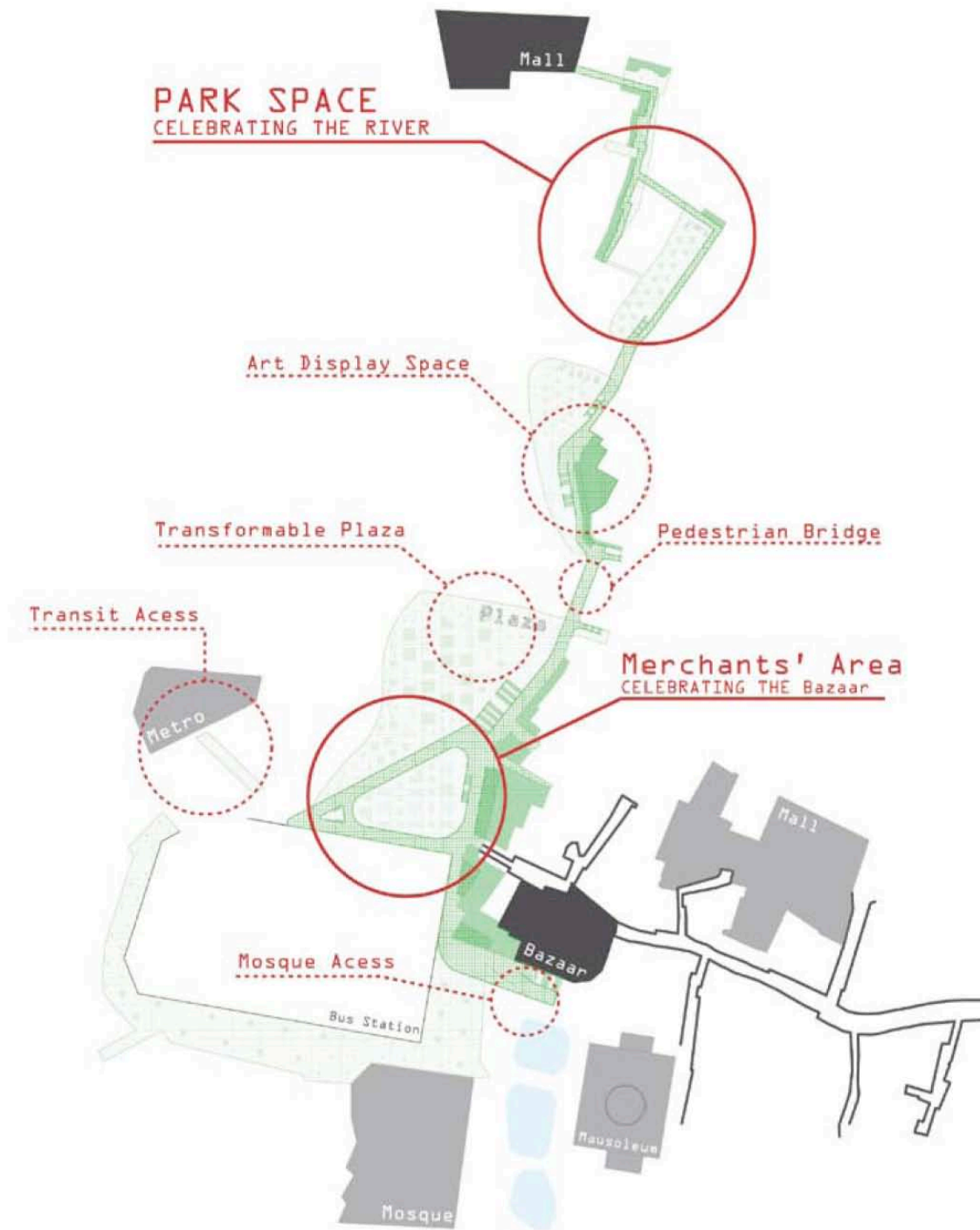


Figure 84 Urban Spaces and activity zones created through the skin's path from the historic Bazaar to the modern shopping Mall [image provided by author]

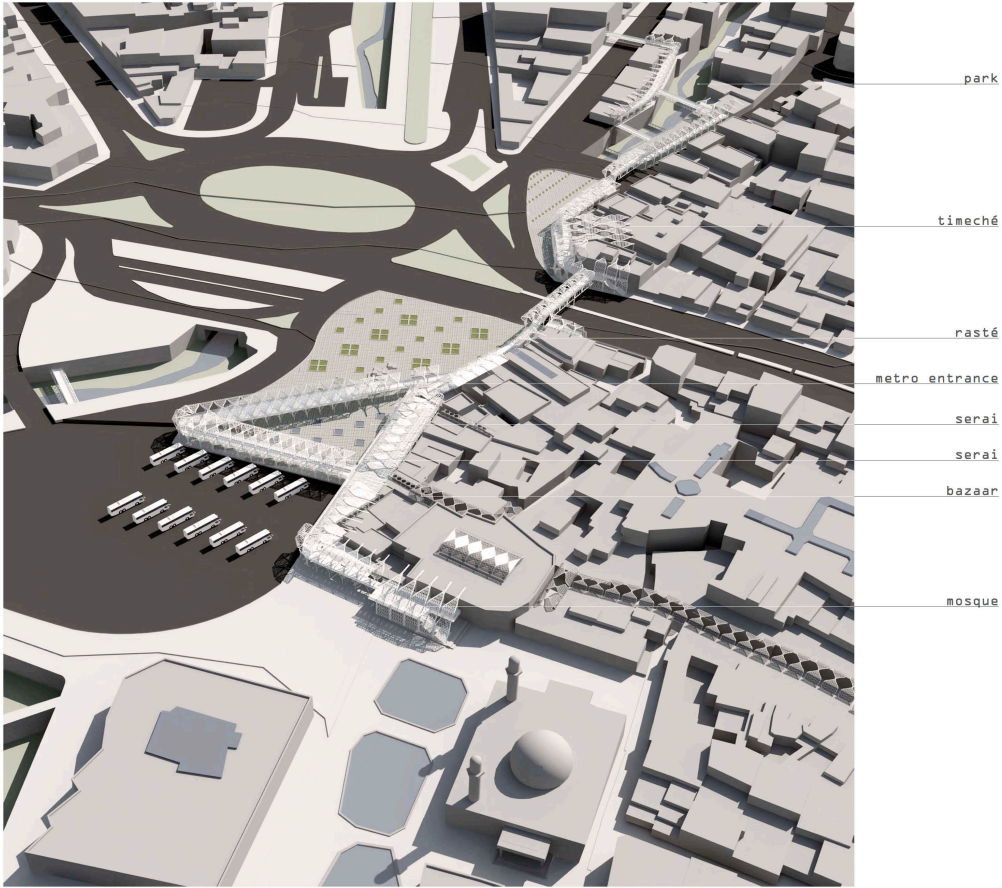


Figure 85 Aerial of Tajrish Square with skin intervention connecting the modern shopping Mall to the old Fabric of the bazaar and providing for amenities and opportunities along its way. [image provided by author]

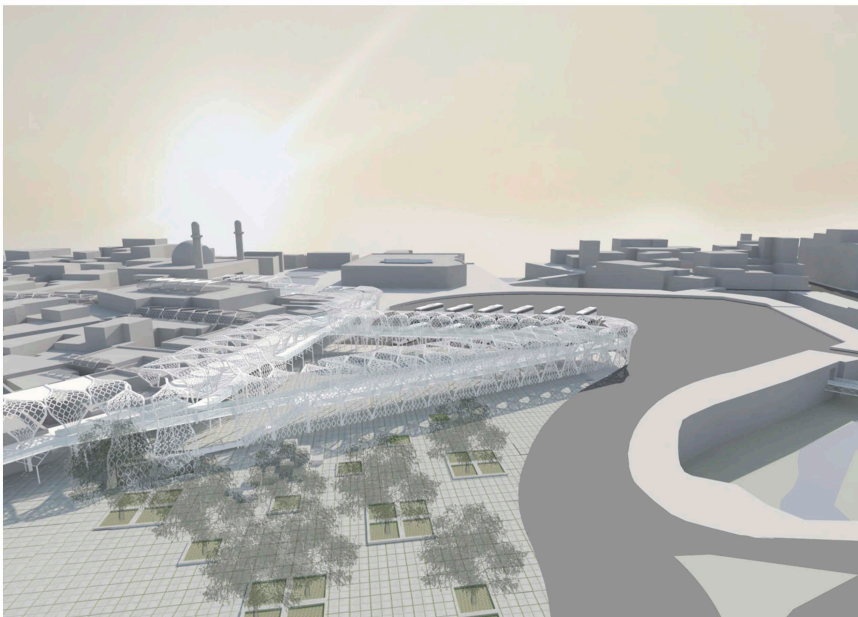


Figure 86 Aerial of Tajrish open plaza connecting to the Serai (open courtyard) and continuation to the Mosque and the Bazaar as a network [image provided by author]

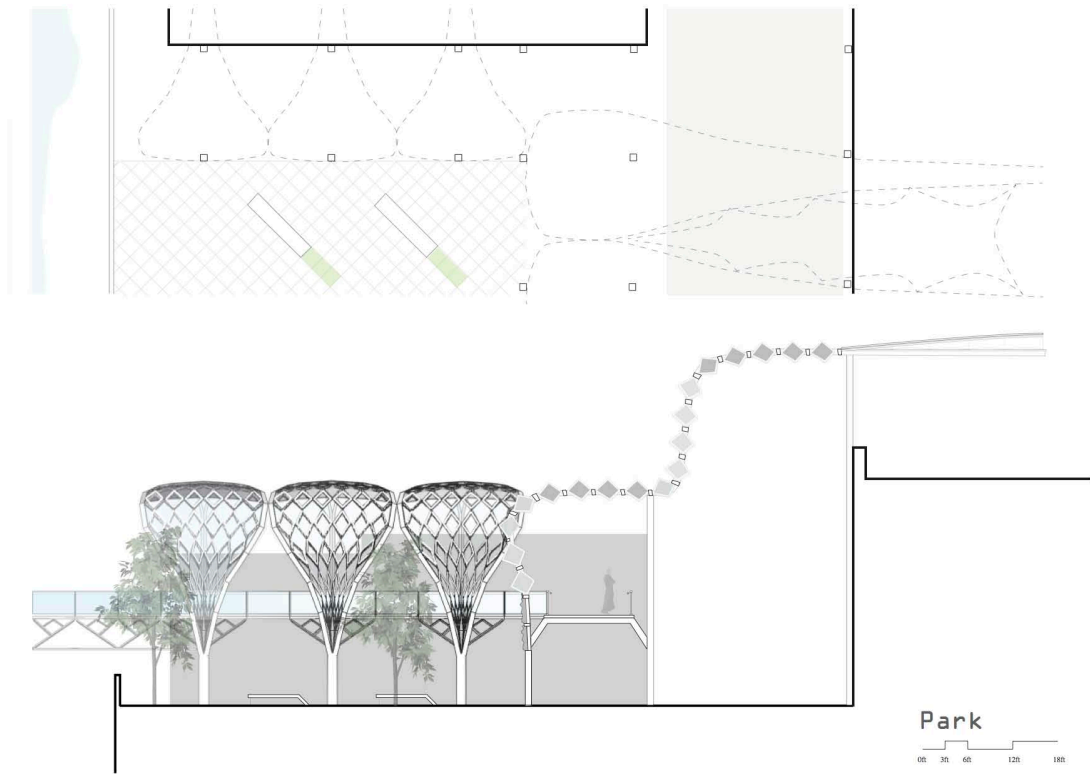
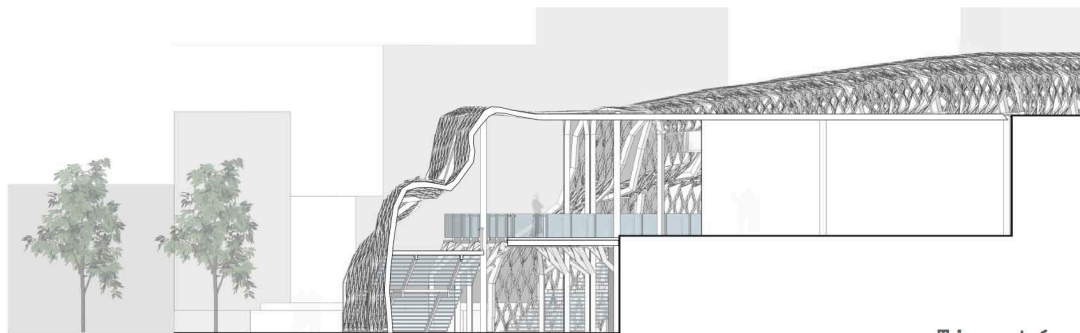
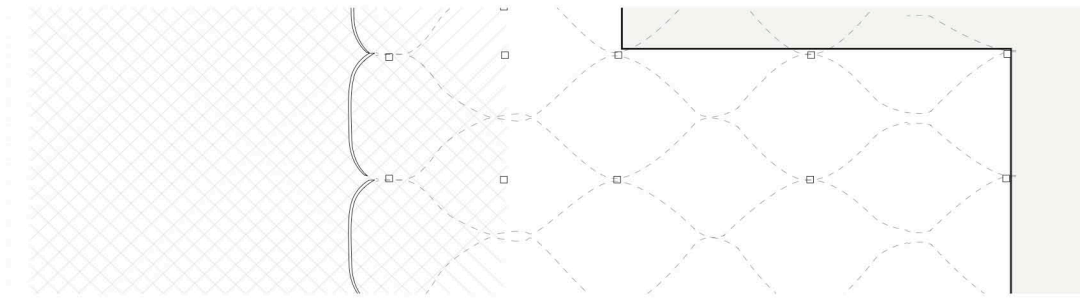


Figure 90 Plan, Section, and Perspective of Park overlooking the mountains and the river, also allowing for vertical growth of vegetation on the independent skin system acting as a wall here [image provided by author]



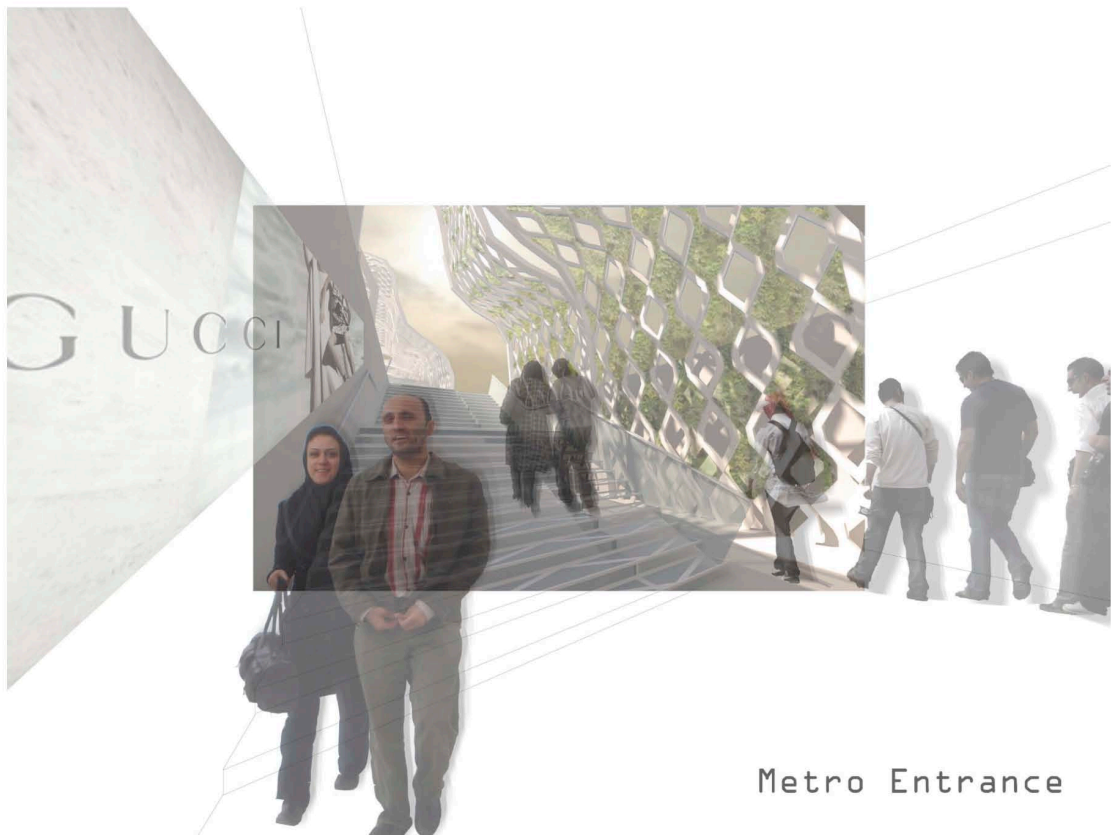
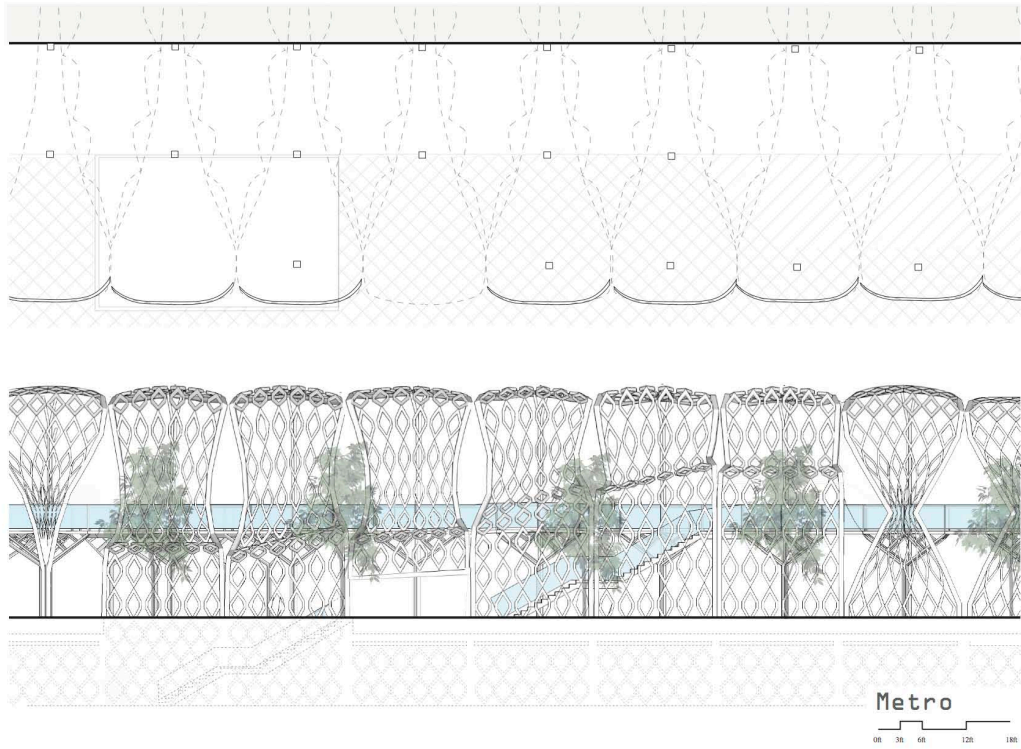
Timeché
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Figure 91 Plan, Section, and Perspective of the Youth Gallery on the rooftops based on the historic Timeché motifs [image provided by author]



Figure 92 Plan, Section, and Perspective of the bazaar extension, where the design is based on the traditional rasté. [image provided by author]



Metro Entrance

Figure 93 Plan, Section, and Perspective of the Metro Access to the underground pathway [image provided by author]

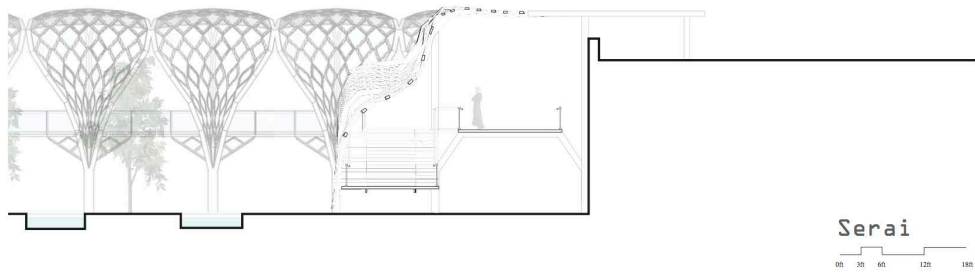
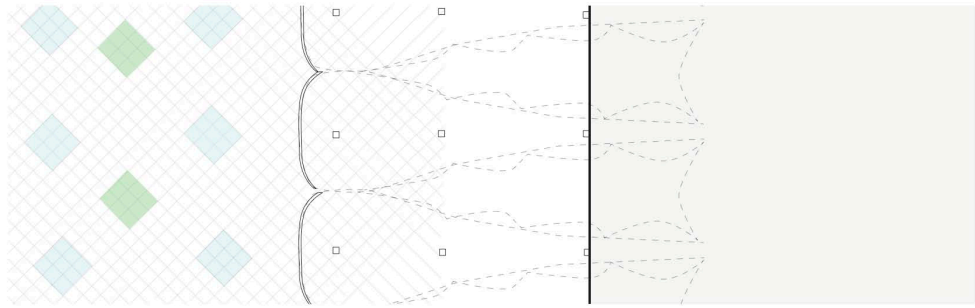


Figure 94 Plan, Section, and Perspective of the stairway in the Serai using the stair module; as well as the modular and easy to built grid of the plaza [image provided by author]

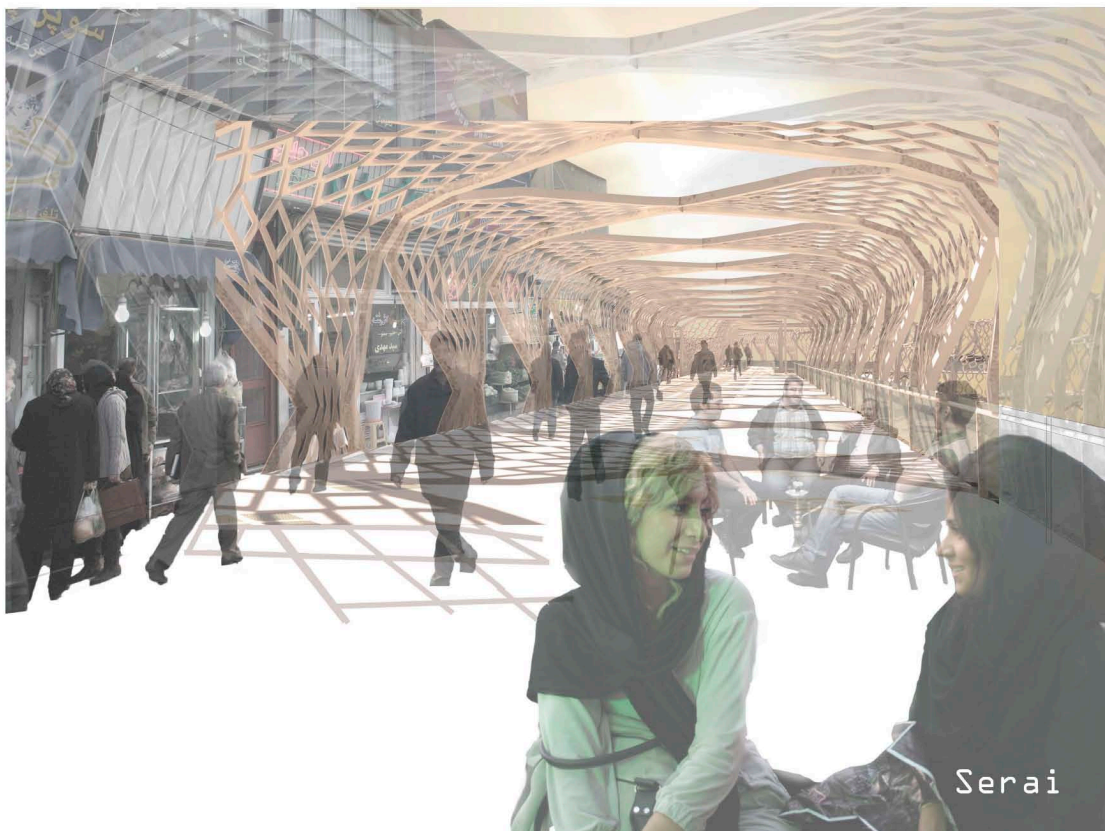
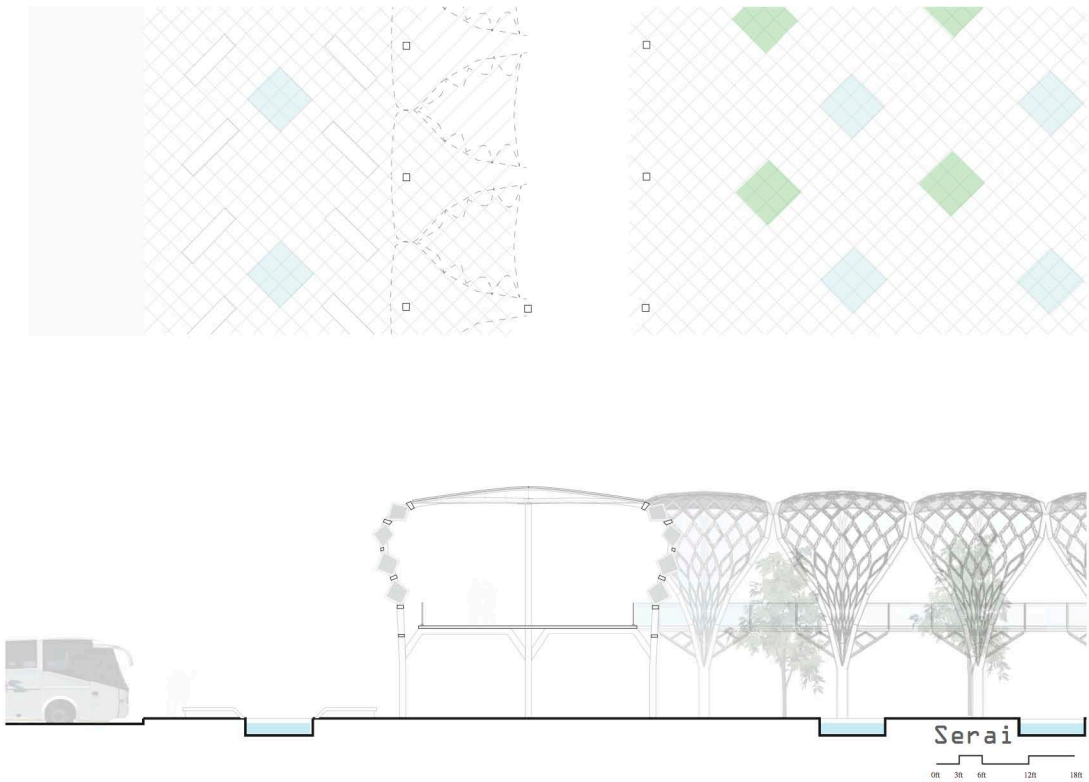


Figure 95 Plan, Section, and Perspective of the skin surrounding the Serai or the historic based traditional bazaar courtyard [image provided by author]

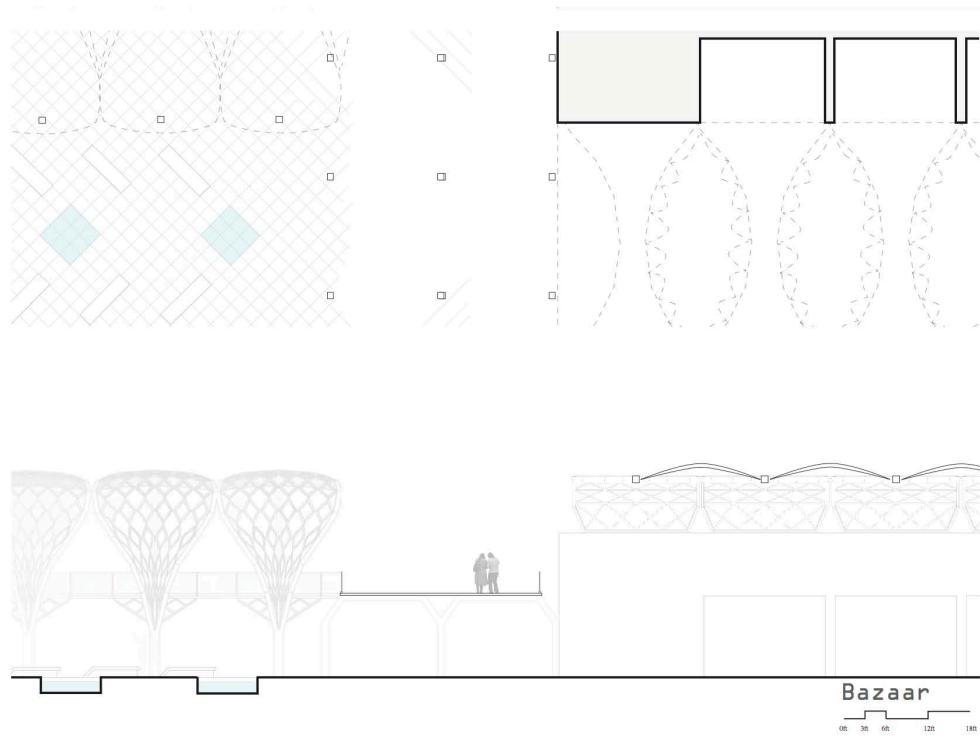


Figure 96 Plan Section, and Perspective of the Bazaar demonstrating an optional use of the skin system as a ceiling cover for the extension of the bazaar into the city fabric, with the possibility of fabric additions in order to capture air as well as for a shading device.

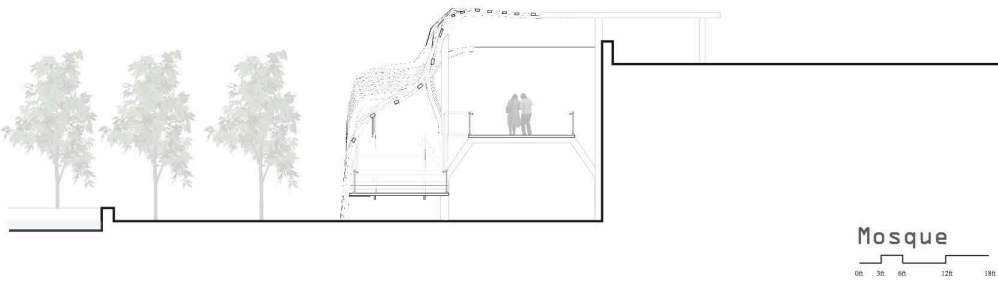
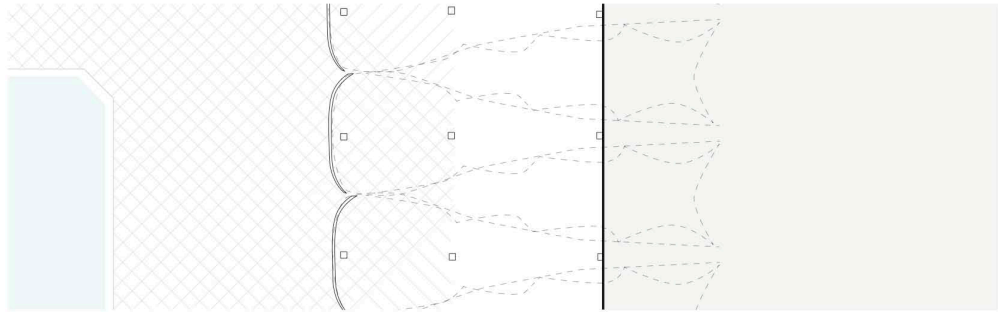


Figure 97 Plan, Section, and Perspective of the Mausoleum entry, as another important bazaar element [image provided by author]

Social Resolution

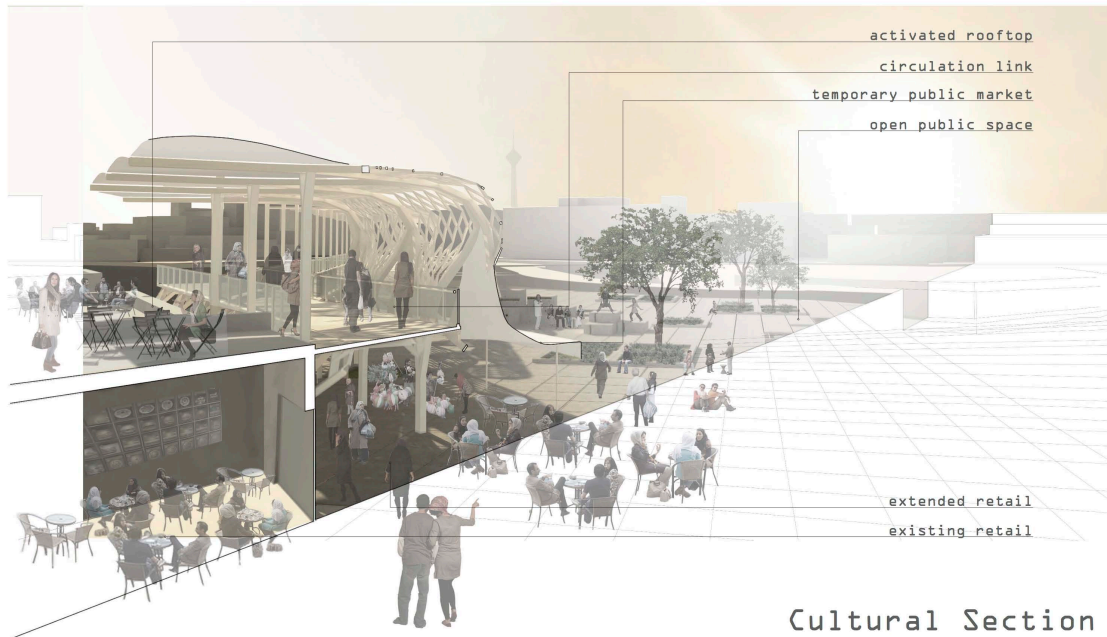


Figure 98 Section through a typical skin bay demonstrating the various zones activated by the system's employment [image provided by author]

The main function of the skin as a connecting medium is not only to connect to various urban nodes together but to also connect the functions of the building interior itself with that of its exterior. Using the skin as a medium, areas of the building such as its rooftop can be put to use for public purposes. Also, with the addition of the fabric, the skin will have an additional temporary layer that can be added or subtracted as necessary.

Chapter 7: Conclusion

This thesis has highlighted the building façade as a major architectural element capable of addressing a variety of issues ranging from site-specific socio-cultural issues, to sustainable issues, to economic issues. It has mocked a wide range of functions that could take place within that layer in order to benefit the most from the mere fact of its “location.”

The scheme simply acts as a stepping-stone for exploring how a multi faceted skin system can be implemented in the urban realm. Perhaps further studies would consider using a more practical template structure that can be applied to any urban condition in any city the skin is placed and be able to adapt to different cultures, in different regions of the world, and with different climates. This research will therefore continue on, as the initial explorations and ideas have been developed to a point where they can be taken further to a more practical and at the same time creative level.

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