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# Open Source Architecture: Redefining Residential Architecture in Islamabad

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**OPEN SOURCE ARCHITECTURE**  
REDEFINING RESIDENTIAL ARCHITECTURE IN ISLAMABAD

MARIAM YAQUB  
ARCH 613 GRADUATE THESIS STUDIO  
MASTER OF ARCHITECTURE SPRING 2016  
ROGER WILLIAMS UNIVERSITY  
SCHOOL OF ARCHITECTURE, ART AND HISTORIC PRESERVATION  
PROFESSOR JULIAN BONDER

# OPEN SOURCE ARCHITECTURE

## REDEFINING RESIDENTIAL ARCHITECTURE IN ISLAMABAD

Submitted in fulfillment of the requirements for the Master of Architecture Degree

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MARIAM YAQUB  
*Master of Architecture*

Date

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Date

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# INTRODUCTION

ACTIVISM THROUGH DESIGN

Islamabad, a planned city, has grown rapidly since its conception in the 1960's but it has not followed its predetermined fate but rather grown haphazardly due to the lack of infrastructure available to implement Doxiadis's master plan. The city was unable to meet the housing requirements of the people causing them to build gated communities on the outskirts of Islamabad and its sister city, Rawalpindi. The market demands caused city prices to rise exponentially, increasing the economic divide between the social classes. The city which was once supposed to reflect diversity of social classes became home to the elite and the privileged. To heal these woes, the government needs to rethink the by-laws to echo the changes in the economy and society of Islamabad.

Today, the city is facing multiple issues politically, economically and socially. The energy crisis is opening up the need for people to find alternative energy solutions. By defining a set of principles which reflect the teachings of vernacular architecture and employing renewable energy techniques, this thesis envisions a matrix of solutions tackling these issues. An open source platform would provide a data base of options for the 4 different types of dwellings defined by the housing authority. This would engage the city in an architectural discourse that does not currently exist, it would invite the layperson to understand and build awareness in the general population from architect to owner to builder.

View from Rawal Lake towards Islamabad





**2 ISLAMABAD**

# ISLAMABAD, PAKISTAN

Coordinates: 33° 49'-0" N; 72° 24'-0" E

Area: 906.50 km<sup>2</sup> (350 sq mi)

Urban Area: 220.15 sq. km (85 sq. m)

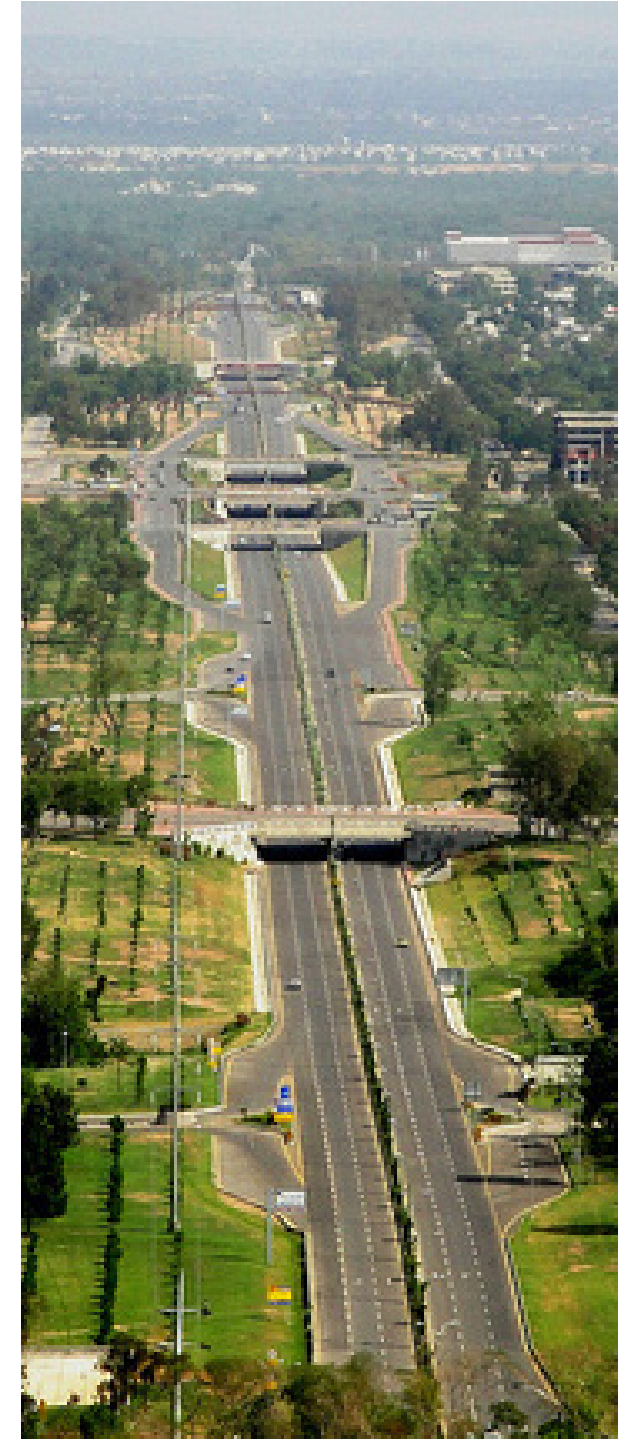
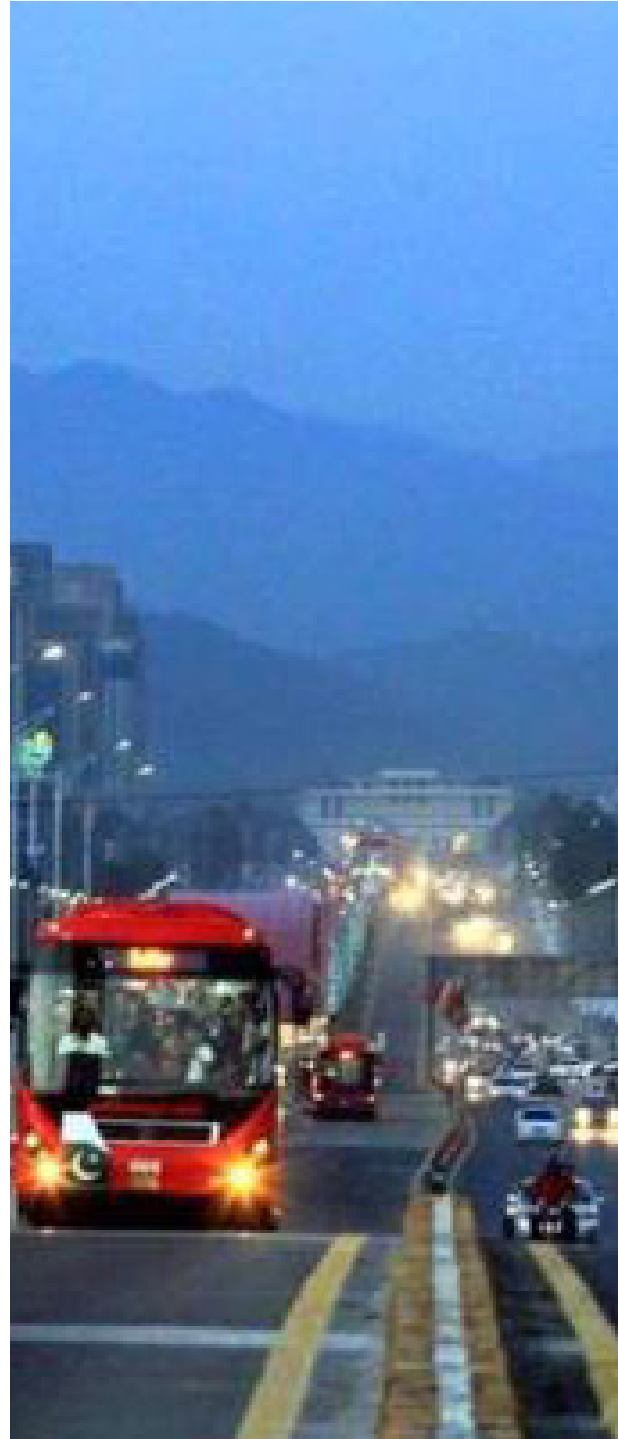
Rural Area: 466.20 sq. km (180 sq. m)

Park Area: 220.15 sq. km (85 sq. m)

Population: Capital Territory: 1.9 million

Languages: Urdu and other regional dialects

Islamabad is the capital of Pakistan, located in the Indian Subcontinent in Asia. Islamabad perched on the North West corner of Potohar plateau at the base of the Margalla hills in the North creates a picturesque hub for a new face of the country. The proximity to the hills invites all four distinct seasons; hot summers followed by monsoon rain and cold winters with sparse snowfall in the hills. Although an urban landscape, the city is home to a plethora of wildlife ranging from wild boars to mountain leopards.



The capital was chosen specifically to be a separate entity from the business and commercial hub in the south, Karachi, in order to be easily accessible to the remotest corners of the country. It also reflects the diversity of the nation as a cultural hub representing every ethnic group. This unique characteristic allows all ethnicities to live comfortably with a sense of belonging.

The modern and carefully planned city with distinct zones: administrative, diplomatic, residential, educational, industrial, commercial, rural and green areas.

The city today embodies the ideals of a developing nation and symbolizes the hopes and energy of a young, dynamic state. Its open minded nature promotes modern ideas while cherishing the traditional values and rich history of the area.

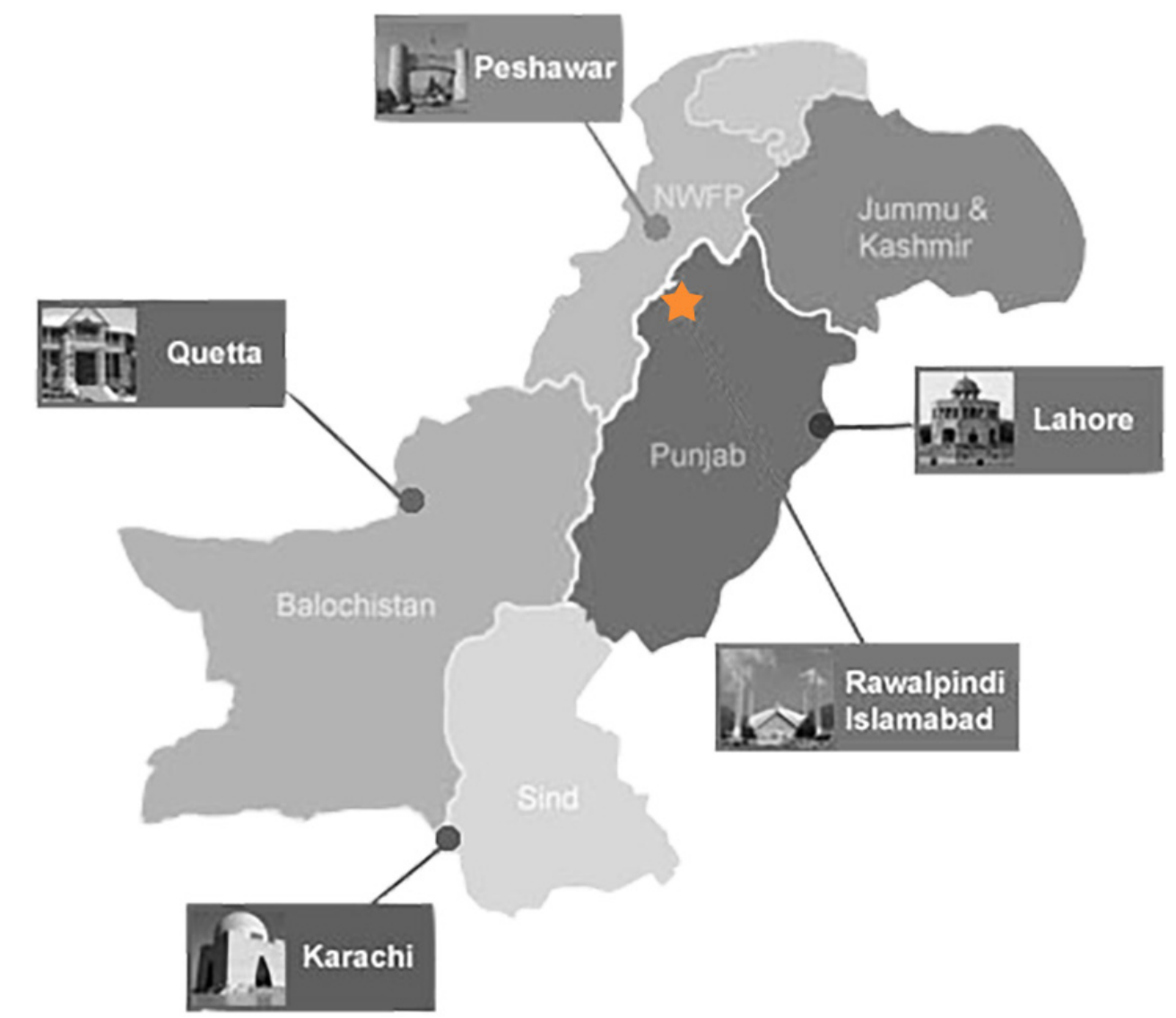
Left to Right:

Metro Bus road expansion on Jinnah Ave view towards Parliament building.

Faisal Avenue with Faisal Mosque beyond.

7th Avenue with Sports Complex beyond.

Aerial view of Blue Area, Central Business District.

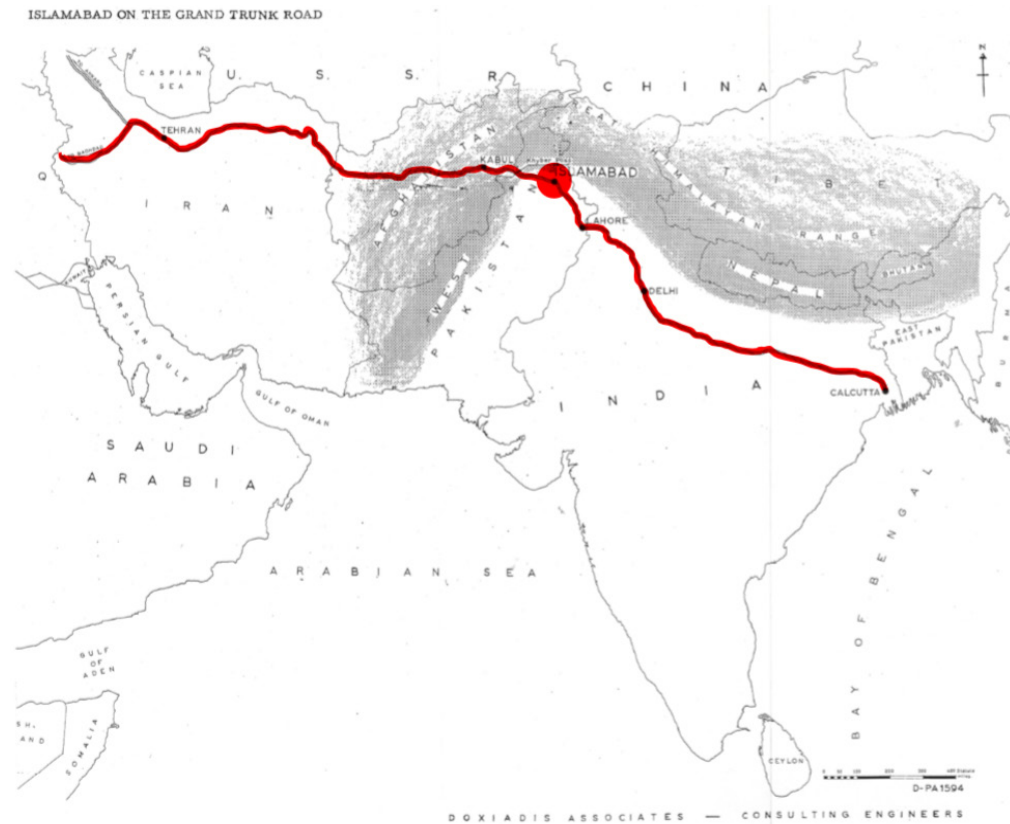


The country gained its independence from India in 1947 losing its then capital city, Delhi. In need for a new capital C.A. Doxiadis, the Greek architect along with President and Military Dictator, Ayub Khan applied his knowledge of Ekistics and urban planning under the influence of Khan's ulterior motives to strategically locate the new capital close to the military headquarters of Rawalpindi. Today the city, built on the idea of thinking of the future rather than dwelling on the past embodies the modernist architecture of the 1960s. The capital a two-nuclei metropolis has merged with its counterpart, Rawalpindi to form a megalopolis, simultaneously growing, old and new.

Doxiadis explains his thinking behind the creation of Islamabad based on his five Elements of Ekistics: Nature, Man, Society, Networks (roads, power, etc), Shells (houses and buildings) aimed at achieving harmony between inhabitants and their physical and socio-cultural environment. The plan for Islamabad separates cars and people, allows for easy and affordable access to public transport and utilities and permits low cost gradual expansion and growth without losing the human scale of 'his' communities.



Doxiadis stated in his article *Islamabad, The creation of the new capital*, the leading considerations for selecting the new site for the capital. The new capital must be able to reflect the diversity of the population of country thus situating it near the northern areas for better access. The geographic location strategically places Islamabad near Asia's main highway, Grand Trunk Road, the historic backbone of Western Asia connecting Tehran, Kabul, Peshawar, Lahore, and Delhi with another highway leading to Kashmir and the mountainous areas in the North. The location also correlates with other major cities emerging in this central location in Asia, such as Chandigarh. Mohr, in his thesis on *The people in the city of the nation: Re-viewing Islamabad's fifth function*, describes "Chandigarh's project to derive an Indian Identity, the buildings to provide an unquestionably modern one. The same is true for Brasilia. In Islamabad, a series of moves conspired to produce a result that reflects not the modern, secular democratic ideals of a new country, but rather an ornamented and singular expression of power concentrated in the hands of the presidency, in dominion over the city." (Mohr, 81)

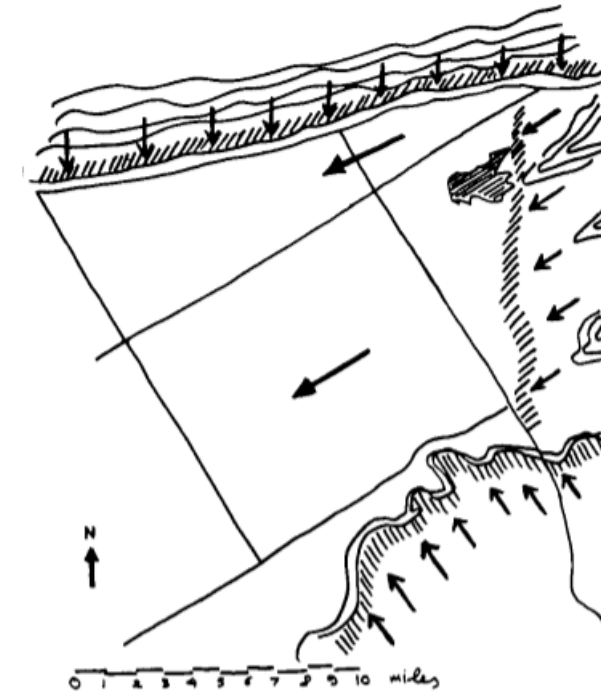
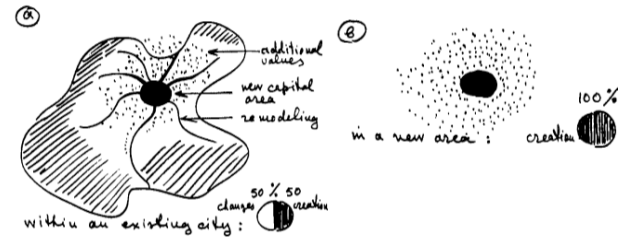
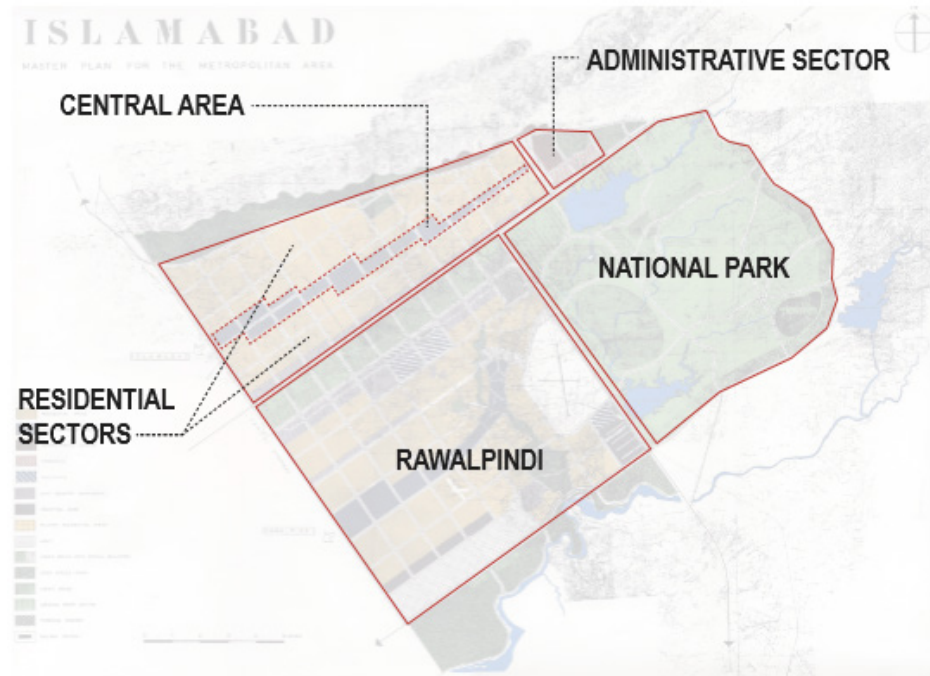
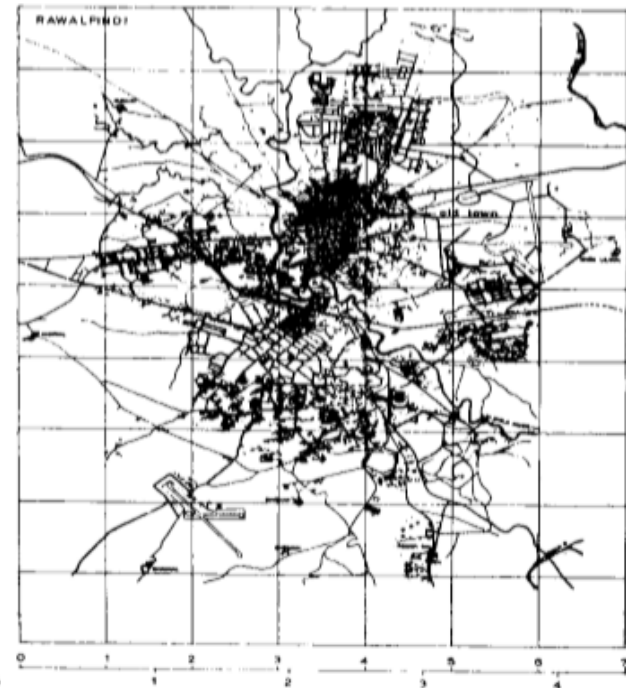


Map of Islamabad location along major trade route, Grand Trunk Road (Mohr)

Images of Islamabad's terrain before development (CDA)



The city was designed on a square grid intended to grow in a unilateral direction. Islamabad contained from the north, the east and the south east due to its geography and was open from the south west was ideal for this growth. The historical city of Rawalpindi in the south was predicted at first to nurture the new city which would then envelop the old city into the iron grid of the new city as it grew. Doxiadis didn't seem to take into account that the Rawalpindi itself was a growing city and the two cities have grown to collide with one another in a rather disorganized and unanticipated fashion. He didn't consider Rawalpindi's economic potential, a separate governing body from its new sister city. Islamabad was governed by the federal government whereas Rawalpindi was governed by the provincial government and cantonment. As Islamabad grew and the housing demand increased the portion of the land dedicated to agricultural infrastructure became an unplanned development of low income housing due to its proximity to the central business district and the capital complex. Instead of Islamabad following a unidirectional growth according to the master plan, it began to grow radially due to the lack of transportation-infrastructure, becoming a disorganized conglomeration of two cities expanding in an unsystematic manner.



Left to Right

Map of Rawalpindi (Doxiadis)

Map of Islamabad (Mohr)

Concept Sketches from Doxiadis article *Islamabad, The creation of the new capital* applying the 5 elements of Ekistics to planning Islamabad.

Uni-directional growth of Islamabad determined through its geographic nature. (Doxiadis)

The modularity of the grid was defined by external forces and internal forces. The external forces defined by machines and mechanical transportation would define the overall scale of the whole. Doxiadis's thinking of this city as a futuristic utopia determined that a sector should not be based on the traditional city block which was prevalent in pedestrian cities of a few 100 people. He believed that it should be divided into sectors of such a size that the urban area can contain dozens of them. The square grid seemed to be the most logical as the rectangular and radial grids were more commonly used in pedestrian cities. Each of these square sectors was further divided into smaller grids depending on accessibility, distance, all determined by the internal force.

The internal force, defined by man, is based on the human scale. Doxiadis studied the patterns of historical cities and determined that these were based on a man being able to reach the center within a ten-minute walking radius. He states in his manifesto that "a grid which, although consisting of static cells based on the human scale, can develop dynamically and unhindered into the future, into space and time." (Doxiadis, 124)

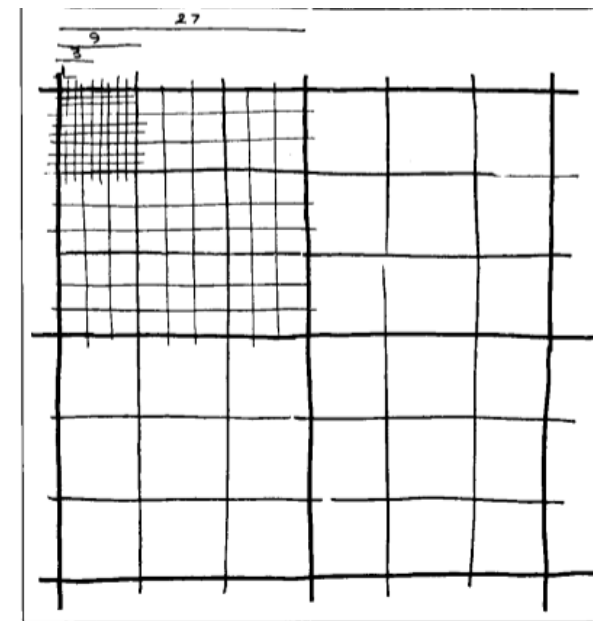


The sectors run parallel to the main axis, Jinnah Avenue which makes a direct link to the Central Area was considered the heart of the city by Doxiadis. The Central Area consisted of the Presidency, the museum of Islamic studies, a national monument, the national assembly, and the supreme court. Jinnah Avenue defined the central business district "Blue Area" which runs adjacent to it. The square sectors form along the major avenue containing a small city in itself. Each sector consisted of housing planned using the traditional city block which plot sizes of different scales to promote an even mix of social classes in each sector. The sector was divided into 4 quadrants with a larger market place in the center. Smaller market places were located in the center of each of the 4 quadrants to provide accessibility at the pedestrian level for the residents. The sectors contained schools, parks and other civic infrastructure to maintain the human scale factor in this larger complex. The grid was designed in a fashion that as the city grew bigger the same module would be able to be applied down the line.

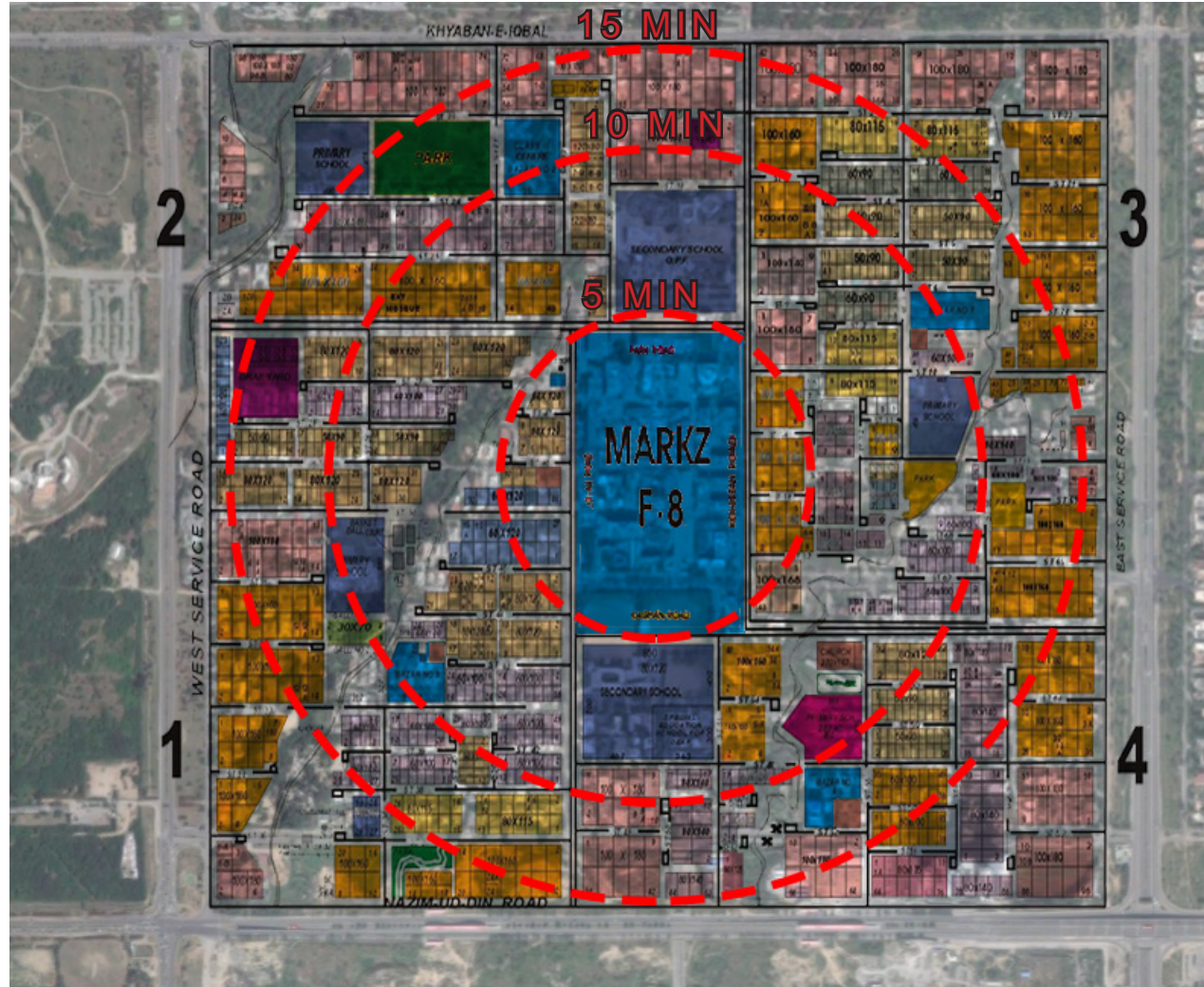
Reading through Doxiadis's manifesto some of the reasons for planning the city the way he did seemed rather arbitrary focusing on the process of elimination rather than stating sound reasoning behind his decisions. It seemed more of an afterthought for backing up Ayub Khan's agenda to create a military capital.

Model of Islamabad (Doxiadis)

Sketch of the planning of the modular grid (Doxiadis)

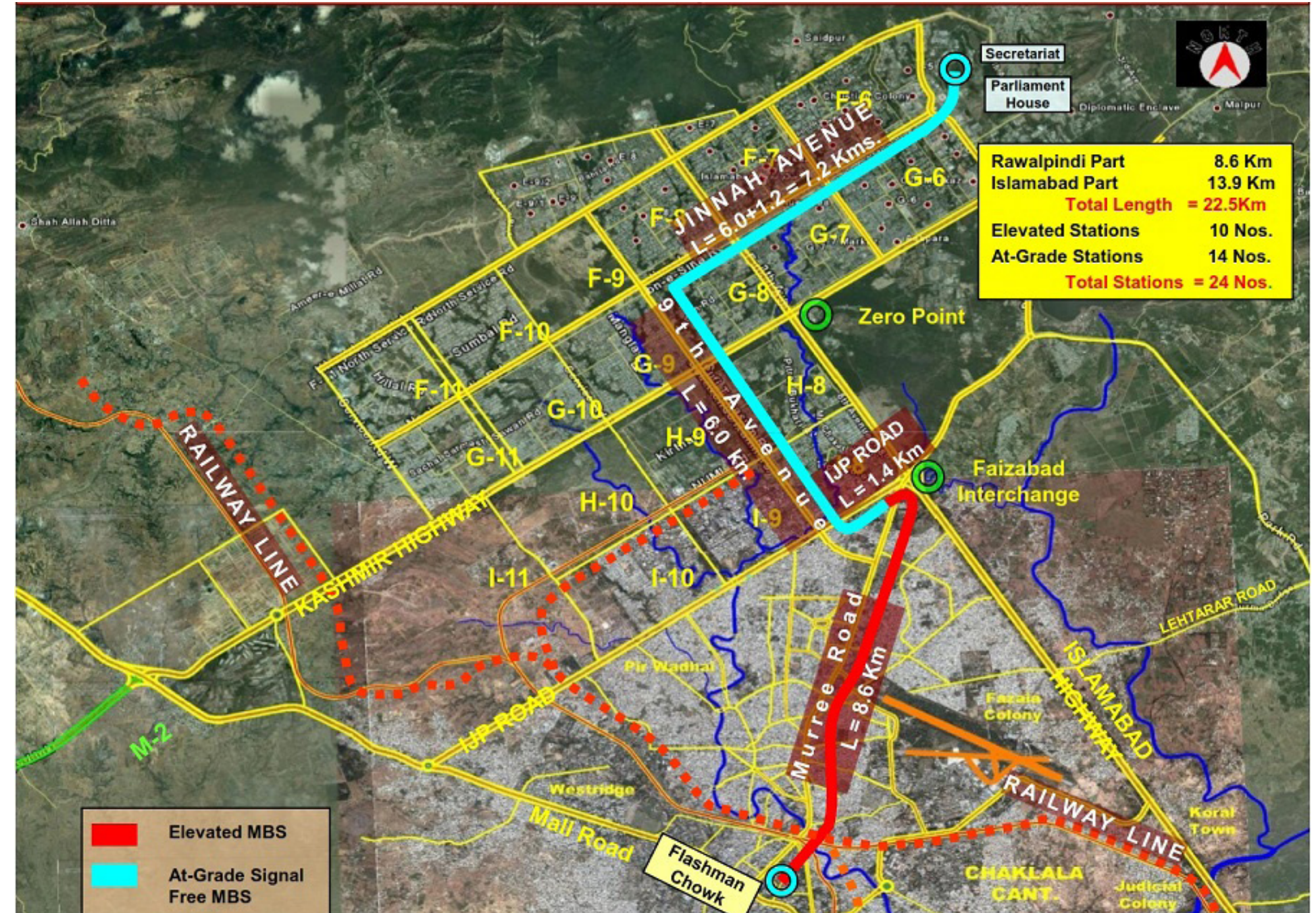






Enlarged Plan of breakdown of sector the four quadrants, highlighting markets, residential plot sizes, institutions and green spaces

Major Avenues and Metro Bus Stops (CDA)



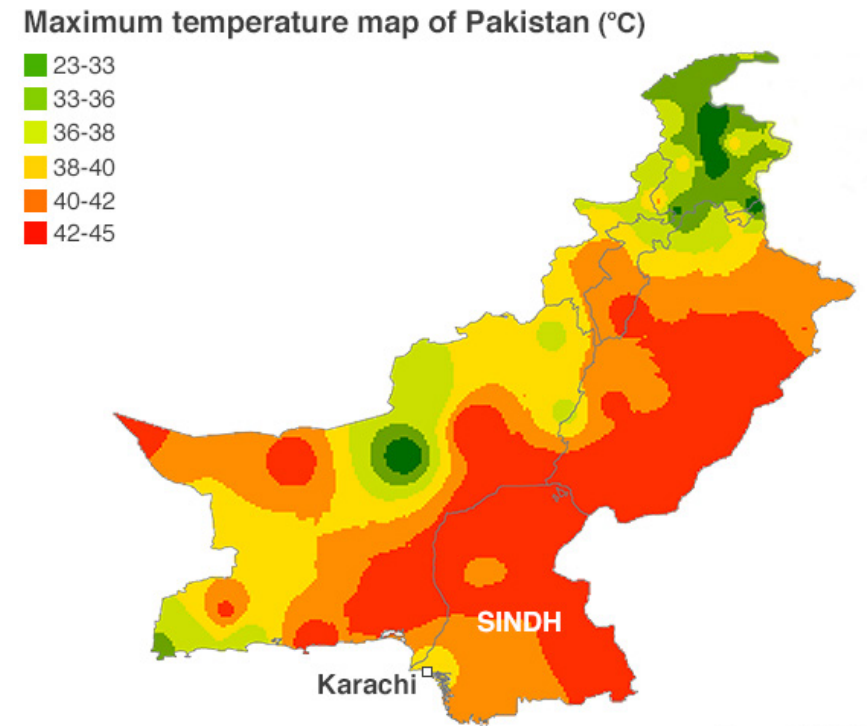
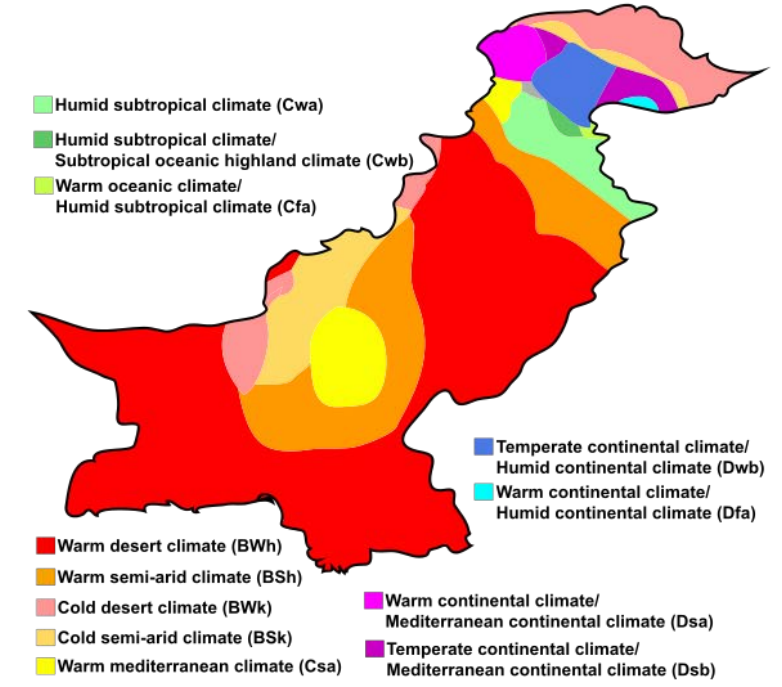
■ Elevated MBS  
■ At-Grade Signal Free MBS



Pakistan is located primarily in the temperate climate zone but due to the geographic nature of the country its length introduces more variety ranging from the more temperate Northern areas to the more arid south. Islamabad's climate is classified as humid subtropical like Sao Paulo, Brazil.

Islamabad, situated in the top northern half of the country is known for its pleasant weather, blessed with all four distinct seasons. Its elevated location at the base of the Margalla hills lends itself to a cold to mild winter from November through February; January being the coldest month with an average low of 2°C (35.6°F). In the hills there is sparse snowfall. Following winter, the city blossoms in greenery throughout the months of March and April. Summers are usually dry and hot during May with June being the hottest month out of the year, averaging highs around 38°C (100.4°F).

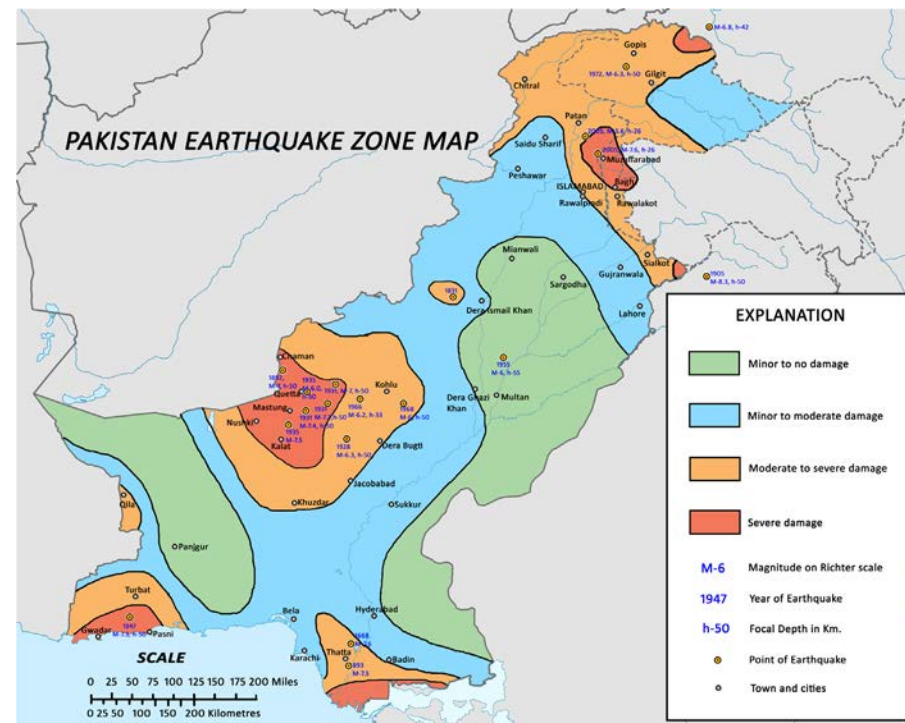
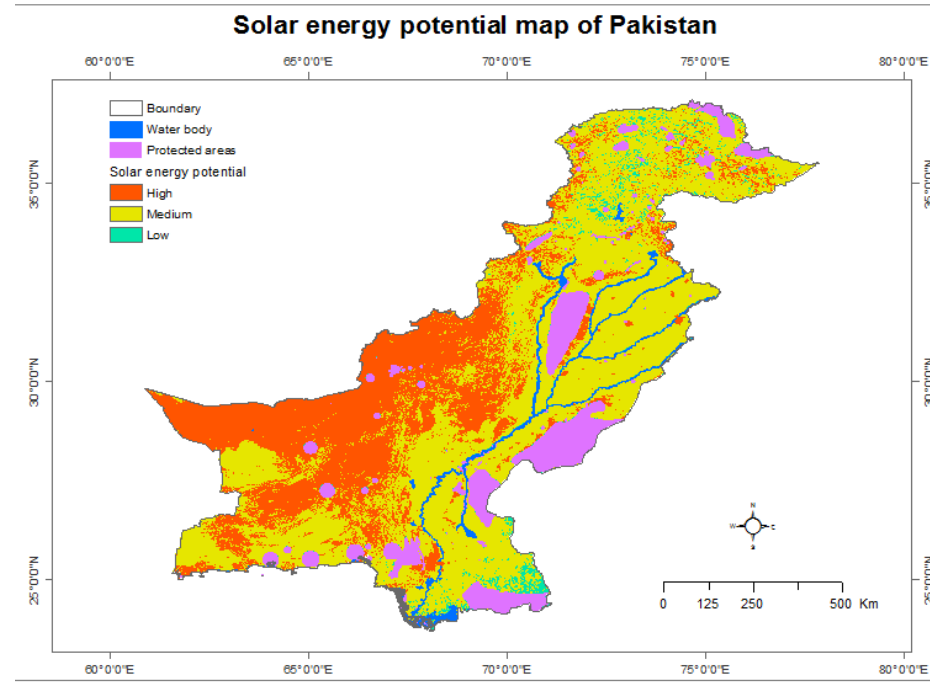
The dry and hot summers are followed by rainy monsoon season lowering the average temperature slightly. July is the wettest month, with heavy rainfall and evening thunderstorms raising precipitation levels up to a monthly average of 10 inches. The main factors that influence the weather in this city are western disturbances which occur every month, but peak during winter months causing rainfall and a decrease in temperature. Southwest monsoon is the other factor which occurs during the months of June to September which may often times cause severe flooding.





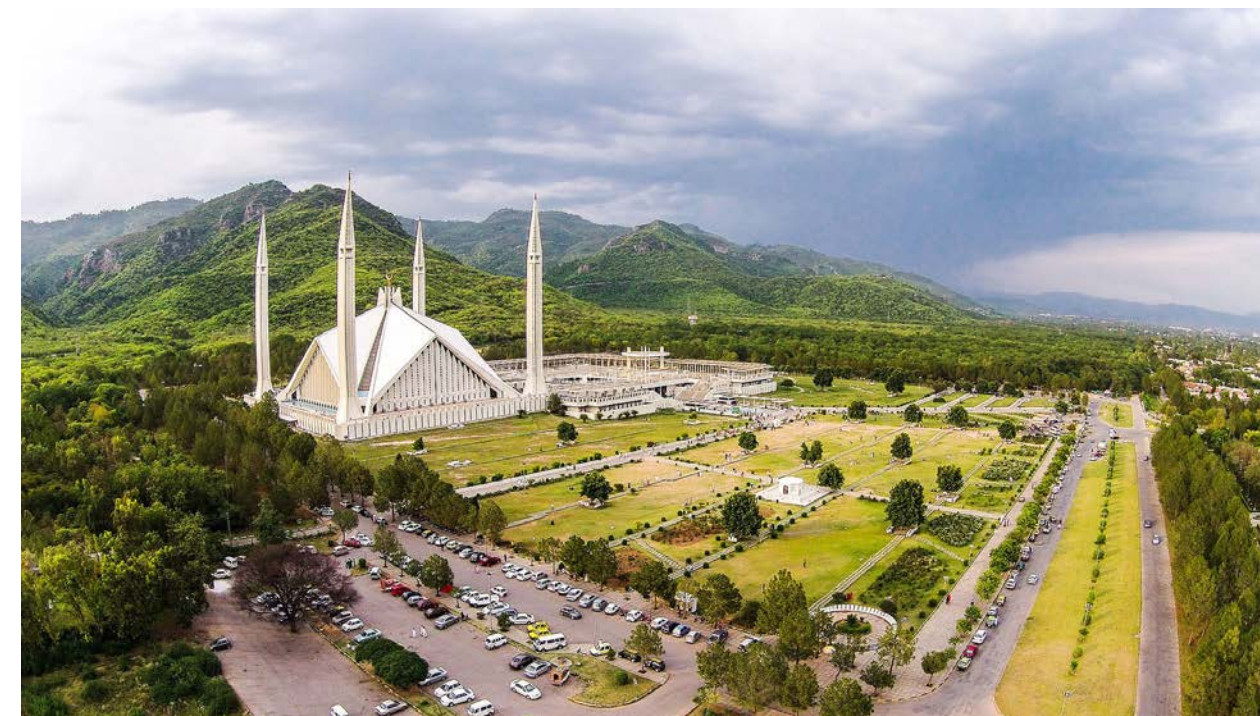
Pakistan is situated on the North Western side of the Indian subcontinent causing it to overlap both the Indian and the Eurasian tectonic plates. The provinces of Sindh and Punjab lie along the North Western corner of the Indian plate, while Balochistan and Khyber Pakhtunkhwa lie within the Eurasian plate. Azad Kashmir and the northern areas are more prone to violent earthquakes as they lie mainly in Central Asia along the Indian plate where the two tectonic plates collide. Structures built in Islamabad must take into account any seismic activity that may occur due to its location near a fault line.

The Margalla Hills National Park is home to variety of local flora and fauna. The 12,605 hectares averages an elevation of about 1000 meters, the highest peak is Tilla Charouni at 1604m (5263ft). The vegetation on the southern slopes is mostly deciduous and evergreen trees with most flowering trees like the Orchid tree, common fig, and trees like *Chir* pine tree, *Banjh* Oak. The north grows pines, eucalyptus, *peepal* trees, neem tree and groves of silver oak. There are 250-300 species of plants out of which two-thirds of them are used by people for medicinal effects to treat and cure various diseases.



The hills are also home to a variety of wildlife including the rhesus monkey, exotic birds, jackals, wild boars, porcupines, mongoose, and the endangered Margalla leopard.

The Margalla hills before Islamabad's development were covered mostly in low shrubbery unlike today; the hills are densely forested and green. This was part of Ayub Khan's vision for Islamabad to be a lush green city. He imported paper mulberry seeds from Australia as they grow fast. These trees were a weed and began to eat away at the indigenous flora. Islamabad immediately became green covered in these fast growing paper mulberry trees but this bio-invasion caused a spread of allergies and threat to the biodiversity of the local flora and fauna. In 1990, the government began to weed out all the paper mulberry trees. Some other invasive species found in the area are cannabis sativa, West-Indian lantana flower, parenthenium hysterophorus all common invasive species found in the urban areas of Islamabad.



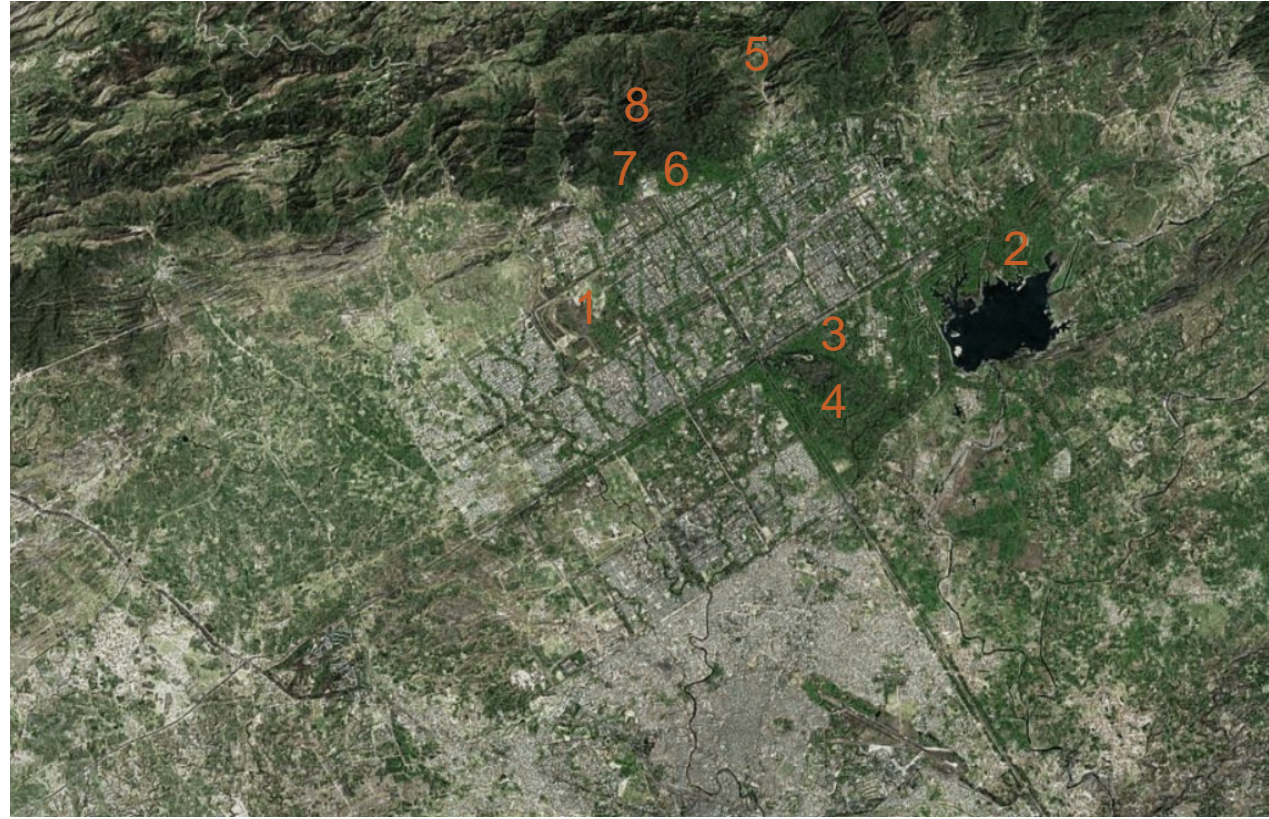
Saidpur Model Village

Daman-e-koh Viewpoint

Faisal Mosque



Doxiadis demarcated green areas in his master plan, some spaces were recreational while others served the purpose of transportation avenues for the future, called green belts. These were located around each sector as 600ft wide strips to account for the future growth of the city. The 'Blue Area' or commercial district which was to continue to spread uni-directionally along with Jinnah avenue, was also left as a larger green belt separating the F and G sectors. Along this green belt untouched for future development was a planned park taking up the entire sector of F-9, named Fatima Jinnah Park after the founder of Pakistan's well-loved sister. He also planned for smaller parks and gardens within each of the sector's subdivisions. The area around Rawal Lake was also demarcated as public park spaces including the shakarparian hills and the rose and jasmine garden exhibiting a beautiful array of the local ornamental species. The Margalla hills national park includes rock climbing areas, trekking and hiking trails, and Japanese Park and Zoo.



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The recreational areas include the Sports Complex housing gymnasiums, pools, national stadiums and auditoriums. Islamabad club is a privatized recreational facility open to members only. The city is also home to multiple museums and monuments such as the National Monument and Museum, Lok Virsa Museum, National Herbarium, National Museum of Natural History, National Art Gallery and redeveloped model villages from the Mughal times. The most famous and the iconic symbol of Islamabad is the Shah Faisal Mosque, designed by Turkish architect Vedat Dalokay in 1986, is a modern interpretation of the shape of a desert Bedouin's tent with the picturesque backdrop of the Margalla hills. This enviable location represents the great importance of this mosque symbolizing the Islamic republic of Pakistan.

#### Parks and Gardens

1. Fatima Jinnah Park
2. Rawal Lake
3. Rose and Jasmine Garden
4. Shakarparian (sweet mountains)
5. Margalla Hills
6. Japanese Park
7. Islamabad Zoo
8. Daman-e-koh Viewpoint



Culture and climate greatly influence the way dwellings have been built throughout the centuries in Pakistan, the vernacular architecture of the region is evident in the historical city of Lahore. Lahore is the bustling capital of the province of Punjab located five hours south of Islamabad. These dwellings are known as *Haveli*, meaning partition or private space in Arabic.

Typically, these tall, narrow row houses accommodated public spaces at the street level with private spaces on the upper levels. At the street level, the space could function as a market or *baithak*, a gathering area for guests, often with a courtyard or *Sahen* allowing prevailing winds to keep the house cool during the hot summer days.

The stacked house with an open courtyard allowed for the inhabitants to occupy the lower cooler levels during the day; and as the temperature cooled in the evenings and the hot air escaped through the open courtyard they would retreat to the upper levels, which housed their bedrooms. The bedrooms would take advantage of the cool breeze at night. The roofs were designed like screened porches to create private but open bedrooms to sleep outside on cool nights during the summer months.

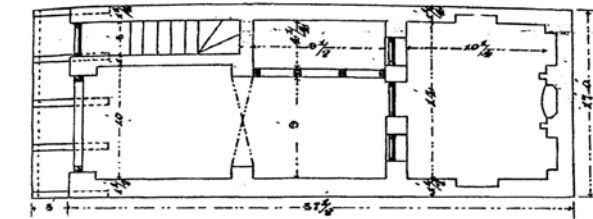
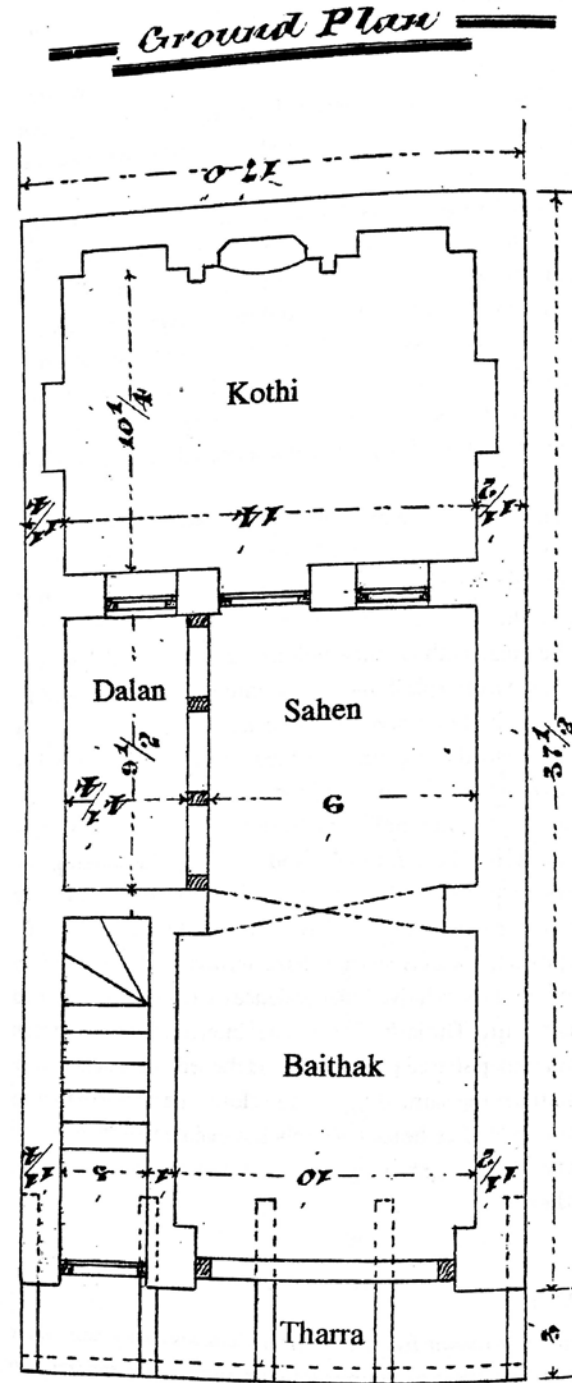
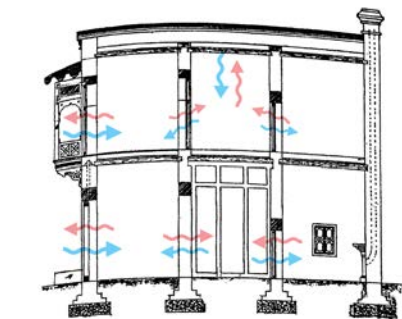
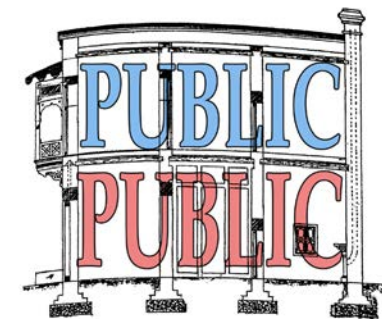


Figure 4.11. Three-room house, Lahore, plan, elevation, section, 1893  
Source: Lahore Municipal Corporation.

The basement, also known as the *Sard Khana* or cold room, due to its location underground, was the coolest space in the house keeping it well-insulated and away from the hot summer sun; these rooms were more prevalent in the bigger homes owned by the noblemen at the time.

The *haveli* was typically constructed from locally manufactured bricks. The walls were unnecessarily thick to address any structural issues and insulate the house from the summer heat. The front façade was plastered in mud or lime, an abundantly available material, and whitewashed. The upper levels which were typically where the women spent much of their time would usually have a projecting bay window, *jharoka*, out towards the street. This screen served two purposes, one as a sun shading device and the other as a screen for privacy so the women could enjoy the city view in private, as per the emphasis of modesty in this culture and religion.

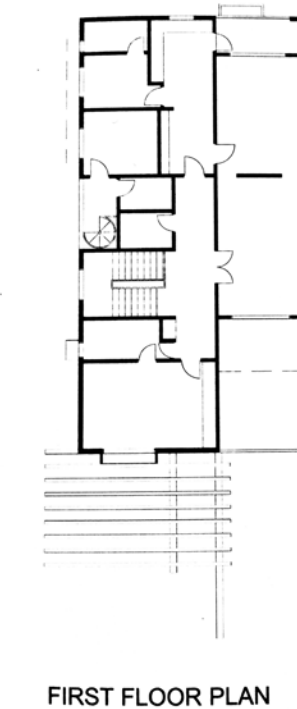
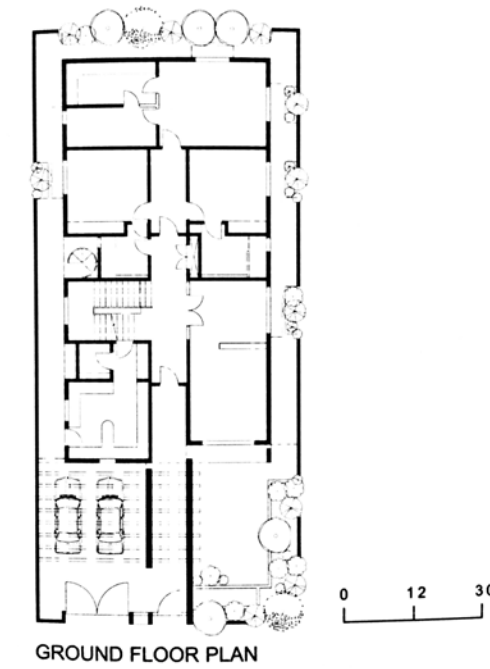
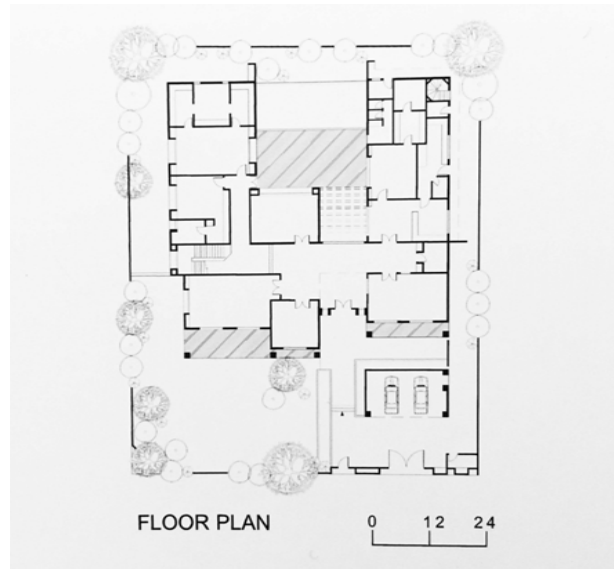


Haveli plans and sections (Mumtaz)



Habib Fida Ali, a famous architect from Karachi, emphasized one major organizing element in his design for the Sheikh House in Karachi, the courtyard. It is oriented to take advantage of the prevailing winds for cooling the house, especially in the evening. He creates a series of gardens allowing for separation of public and private spaces to address the cultural issues of privacy. The minimalist approach to architecture reacts to the dust ridden climate of Karachi by creating smooth textured surfaces.

Unfortunately, the courtyard, an essential component of designing efficiently for this climate is the first item to be removed from the design especially in smaller plots. The setbacks enforced by the government require a garden at the front and rear of the house, and due to the ever growing needs of the clients the total build-able area is entirely used up eliminating the courtyard from the scheme. Although, the courtyard is known to be a beneficial component of the house there is no incentive to save that space for exterior use. The government, instead of making laws that prevent efficient design should change the setbacks to reflect what is learned from vernacular architecture and base by-laws accordingly.



Left to right

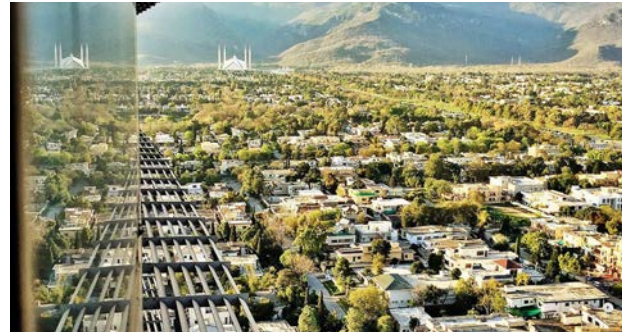
Sheikh House, Karachi, 2005 - Habib Fida Ali (Khan)

Tapal House, Karachi, 2002 - Habib Fida Ali (Khan)

# 3 RETHINKING ISLAMABAD



Today Islamabad is divided into four zones, not at all following the unidirectional growth intended by Doxiadis's master plan. The intention was for the city's core, central business district, to develop along Jinnah Avenue as the residential sectors followed linearly along with it to meet the housing demands. Unfortunately, due to the lack of transportation-infrastructure at the time, the city began to grow radially around the capital area and the main business hub. Rawalpindi, with a life of its own continued to grow radially out causing the two to collide, another unexpected result of the infrastructure not corresponding to the master plan.



Zone I - Islamabad



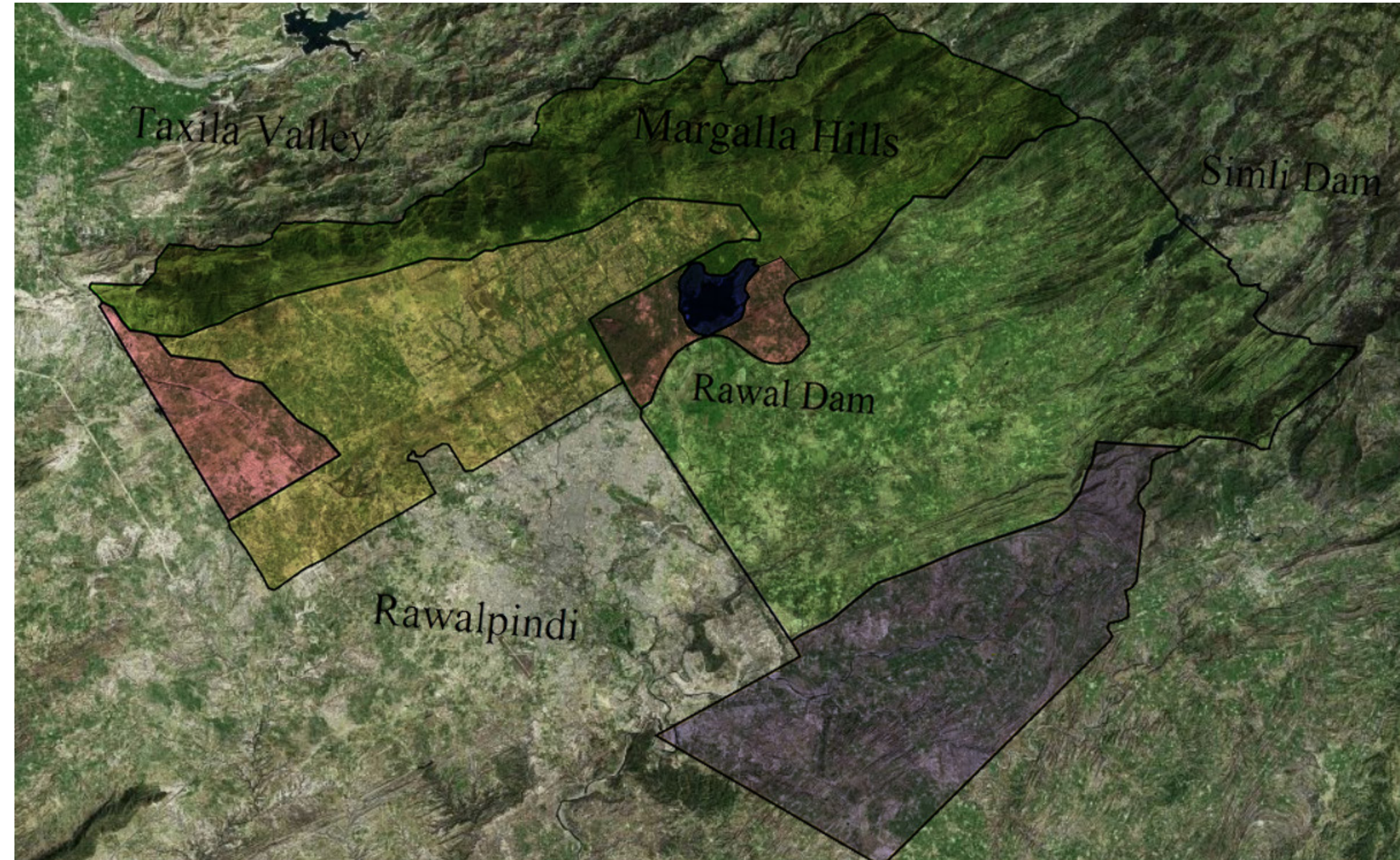
Zone II - Private Housing Scheme and Islamabad Orchards converted to Farm Houses



Zone III and IV - Gate Communities



As both the city's markets grew and developed the need for housing increased. This high housing demand caused the real estate in Islamabad to sky rocket, making it impossible to maintain the social diversity intended in the master plan. The plots were only affordable for the extremely rich to high middle income households. The need for security and housing gave way to gated communities on the outskirts of the city meeting the housing demands for both Islamabad and Rawalpindi.

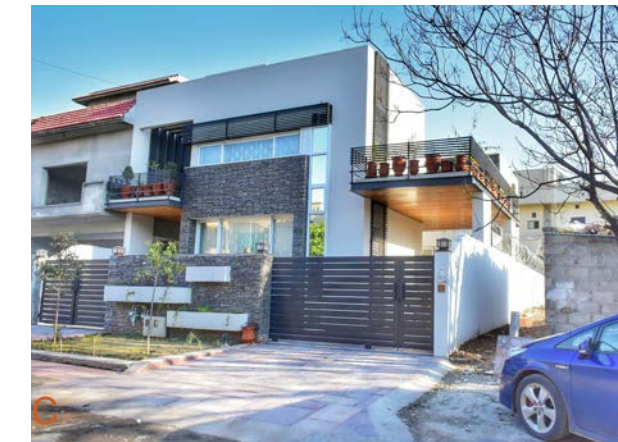
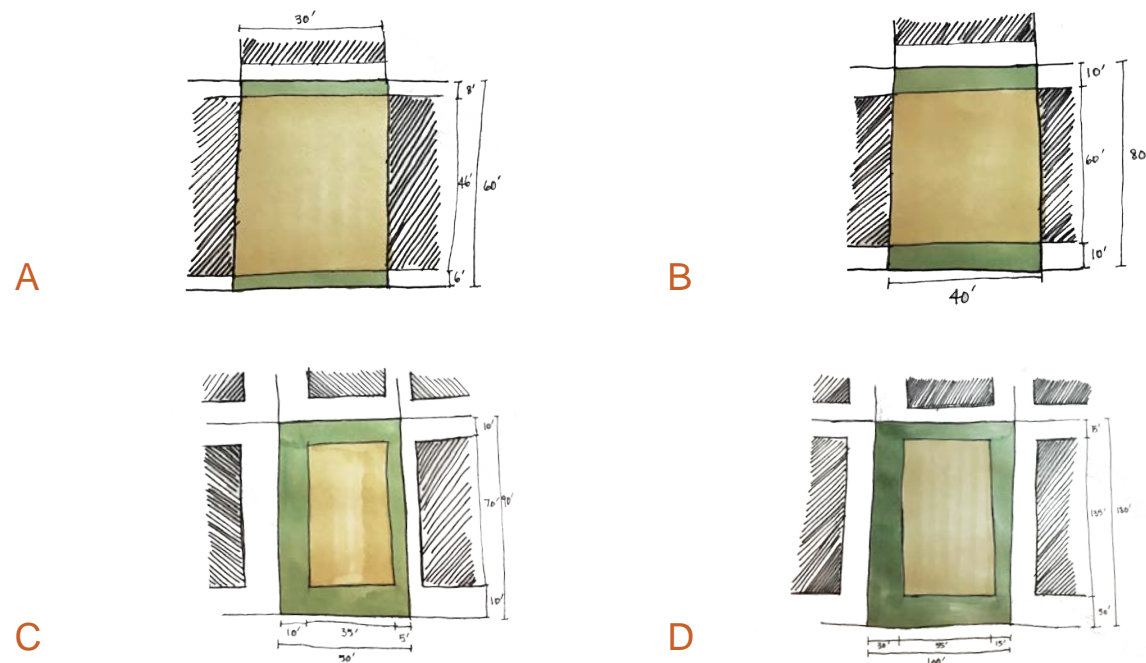




These gated communities and private housing ventures have taken over the governmental infrastructure for housing as they are more efficient and less costly than government allocated housing. This has caused a major diversion from the master plan distorting the grid around existing settlements, *kacchi abadis* to meet the requirements of the ever growing housing market. The land initially allocated to Islamabad Orchards was sold to rich private business men in the 80's; whom were escaping the political unrest in Karachi to settle in the safe and secure capital city.

Islamabad is a cultural hub reflecting all ethnicities in this diverse nation, allowing all ethnicities to feel comfortable and accepted living in this city, eliminating a lot of the animosities and rivalries between the different provinces. In the 90's during the Afghan war, many fled the war torn area of Khyber Pakhtunkhwa to live in Islamabad for more security and better institutions. The prices for the limited land in Islamabad surged due to the high demand for safety making the city an even more desired city to live in.

Zoning District	Type of Development	Plot Size		Buildings				Max. permissible covered area of stair tower	Min. Set Back									
		Area in sqft	Frontage in ft	Floor Area Ratio	Max built up area on GF	Max. no. of Storeys	Max. Height		Front	Side 1	Side 2	Rear						
All private residential plots in Islamabad allowed by the Authority except those in the Diplomatic Enclave	Terraced dwelling houses Type "A"	upto 1350 1359 -1800	20-29	1.2	0.6	2	30'	150 sqft	5'	~	~	7'						
			25-30	1.2	0.6	2	30'		6'	~	~	8'						
	Terraced dwelling houses Type "B"	1809 - 5625	30 - 49	1.05	60%	2	30'	200 sqft	10'	~	~	10'						
									10'	~	~	10'						
	Detached dwelling houses Type "C"	3600-9000	50-59	0.9	50%	2	30'	250 sqft	10'	5'	10'	10'						
									4770 - 12,015	60-69	0.9	50%	2	30'	10'	20'	10'	10'
									6300 - 15,030	70-79	0.9	50%	2	30'	20'	20'	10'	10'
	Detached dwelling houses Type "D"	7965-24,030	80-89	0.85	50%	2	30'	250 sqft	20'	20'	10'	15'						
									7200-26,100	90-99	0.85	50%	2	30'	20'	20'	10'	15'
									15,930-24,480	100 & above	0.85	50%	2	30'	30'	30'	15'	15'



Islamabad needs to adapt to the changing market demands and rethink its by-laws to reflect the cost of living and the subdivision of the plots. The plots, especially those adjacent to major highways and commercial areas are too expensive and large for individual families, which is why these residential plots are illegally being used commercially or institutionally. Not only is Islamabad facing a housing crisis, due to the lack of energy being produced by the country there is an energy shortage. At this junction, it would be beneficial for Islamabad's economy, if the government were to re-evaluate the setbacks for residential properties to reflect the environmental and contextual conditions while reflecting the change in the market demands.

It would be beneficial for the city to consider changing its setbacks to incorporate more density to help subsidize the cost of land in the city to incentivize middle income to purchase land in the city rather than moving to the gated communities. In addition to creating more density, rethinking the setbacks to reflect this change in density could change the face of Islamabad allowing for the residences to have more of a street presence integrating with the exterior boundary wall while producing larger interior courtyard spaces.



CDA, Islamabad's housing authority currently organizes plots into 4 basic dwelling types based on plot sizes. The 4 types represent the rules and regulations for a range of plot sizes depending on their street frontage dimension. The by-laws limit the structure's height to a maximum length of 30' and 2 levels with a partial third floor.

Type A and B are the smaller plots represented as row houses. Type C and D are larger plots representing detached or semi-detached dwellings. Type C are often large single family homes. Whereas, Type D are often subdivided to form two large single family homes sharing a party wall. The setbacks for each determine the buildable area versus the front and rear gardens, car porches and service alleys.

It is prevalent today that these dwellings house multiple families in order to subsidize the cost of living and building in the city. As these are self-funded projects, it's imperative for the owner to find an alternative revenue source to fund and maintain the project.



**1. Type A Dwelling**

Location: House 6, St 20, G-13/3,  
Islamabad, Pakistan  
Plot Size: 30' x 60'  
Typology: Row House



**2. Type B Dwelling**

Location: 595, E-12/4, Islamabad,  
Pakistan  
Plot Size: 40' x 80'  
Typology: Row House - Front and Back access



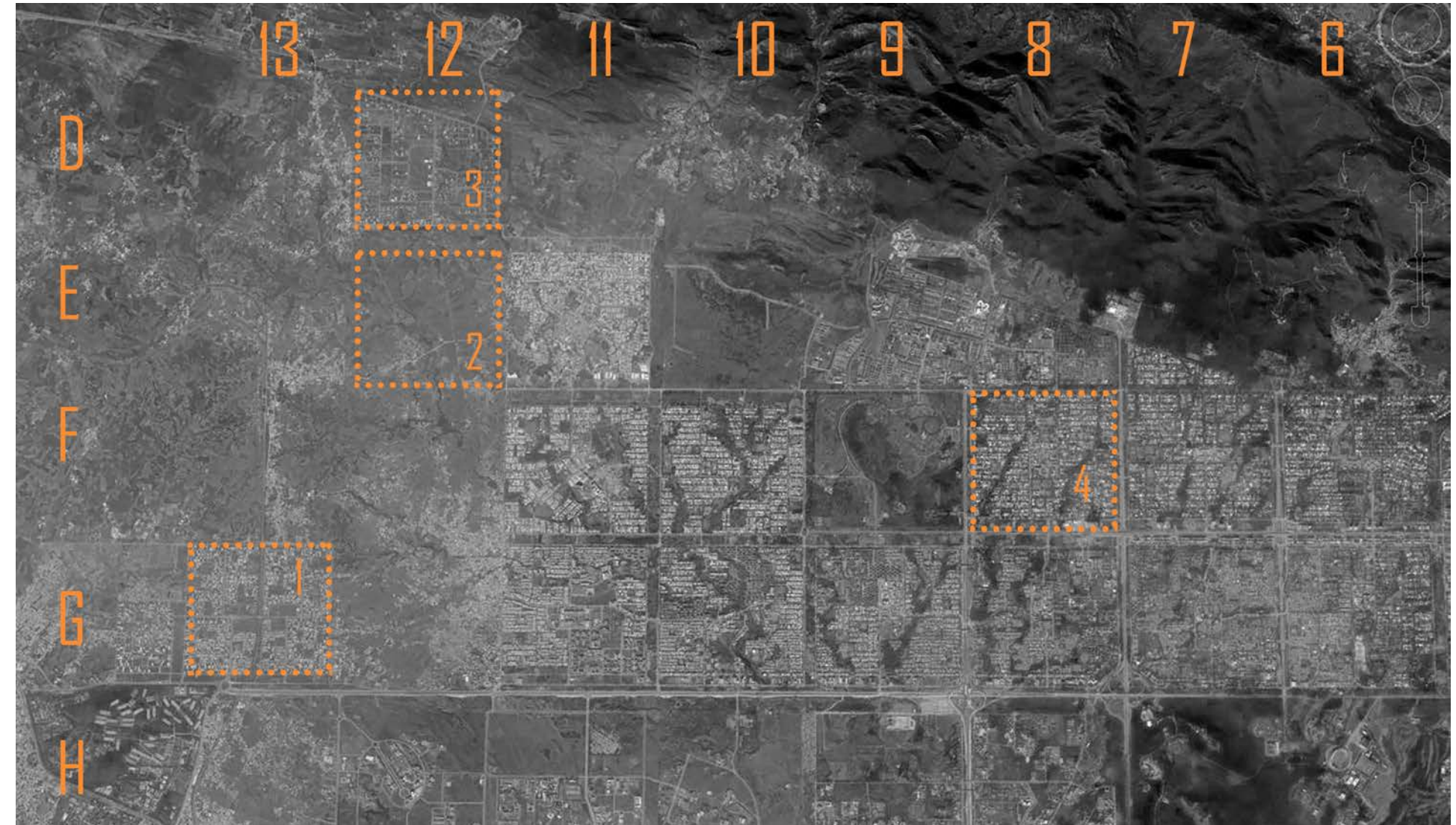
**3. Type C Dwelling**

Location: House 262, D-12/4,  
Islamabad, Pakistan  
Plot Size: 50' x 90'  
Typology: Semi Detached House



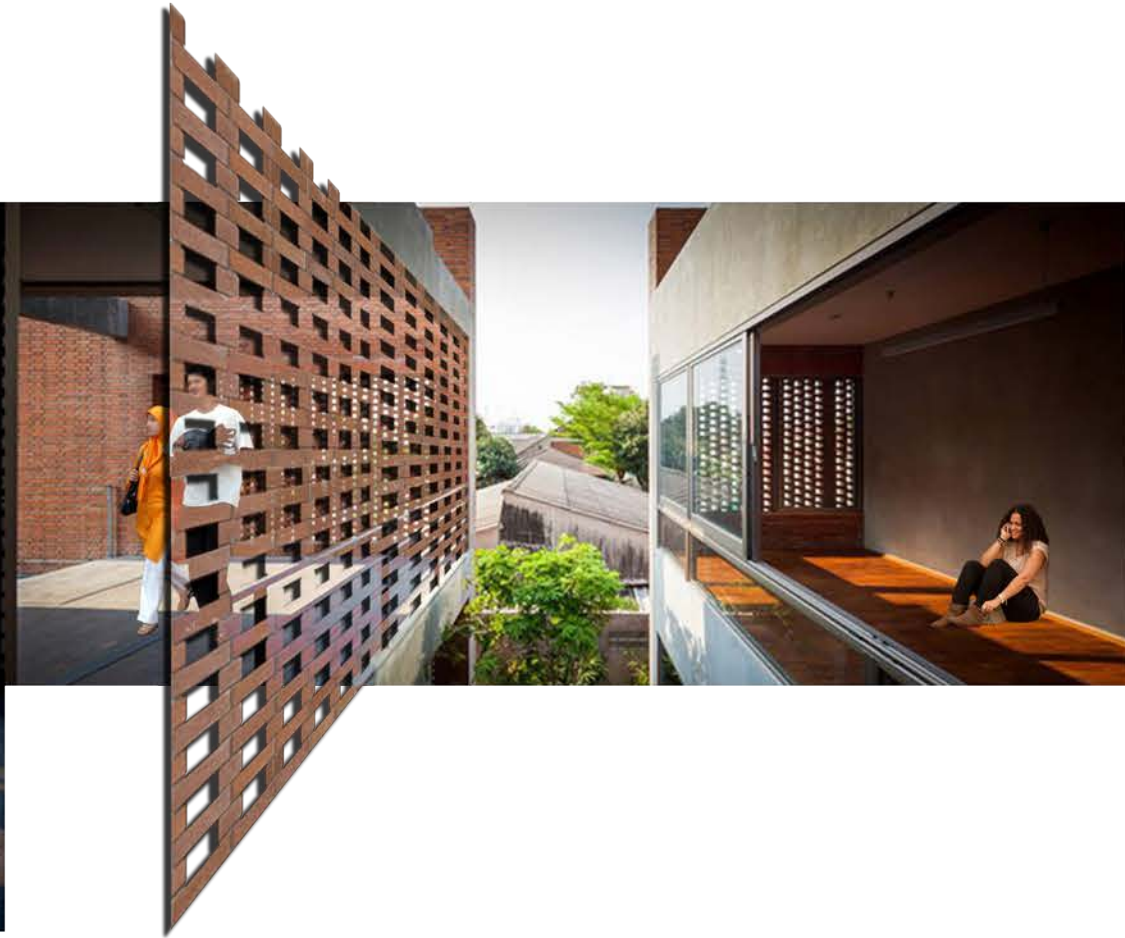
**4. Type D Dwelling**

Location: House 38, Nazimuddin Road,  
F-8/4, Islamabad, Pakistan  
Plot Size: 100' x 180'  
Typology: Detached House



**4 DESIGNER**



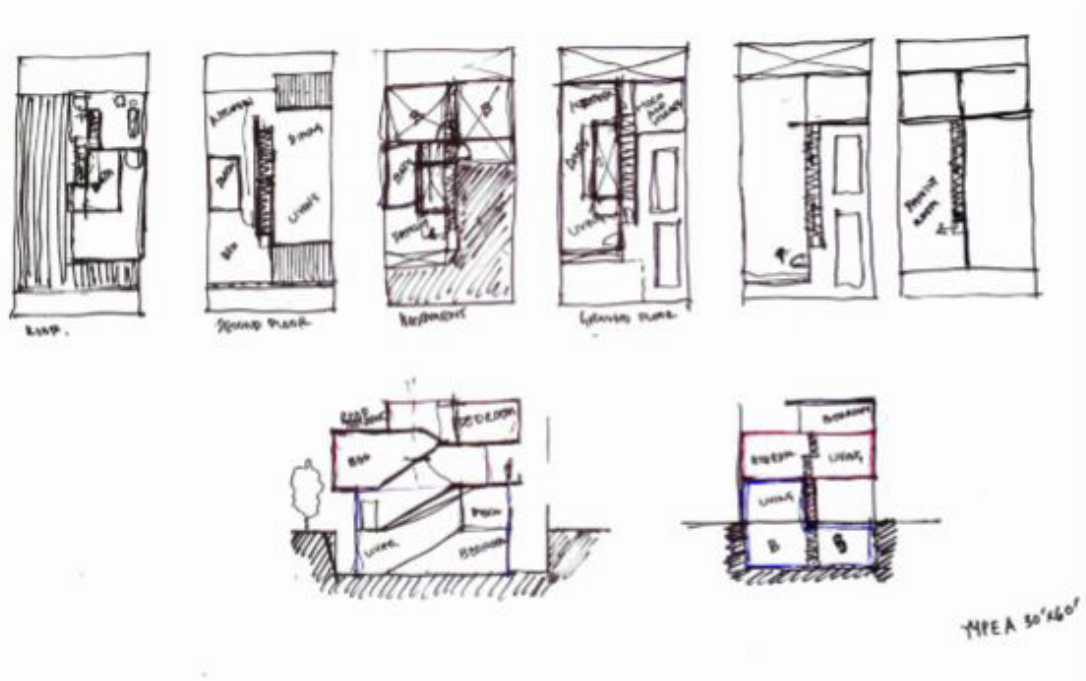


STUDY OF SIZES

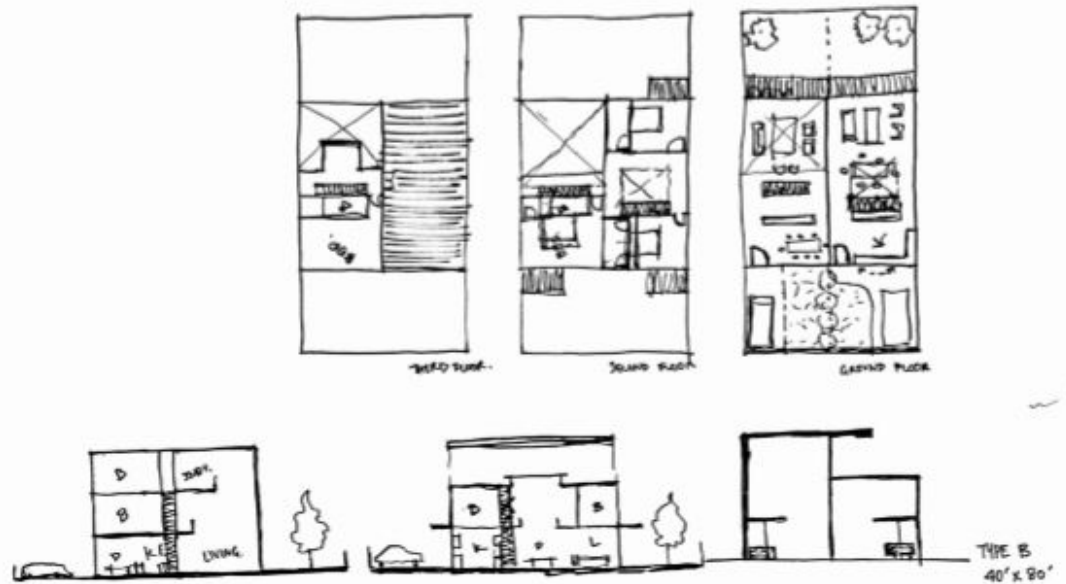


In the case of this thesis it was imperative to conduct a study of options using the existing setbacks provided by the housing authority, CDA to determine what chances would be beneficial and how they could be made. This would require a test to determine how current conditions can be improved under the current set of rules. The thesis helps create a set of principles and a matrix of options for the people to learn from and adapt to, in order to design and build more responsibly.

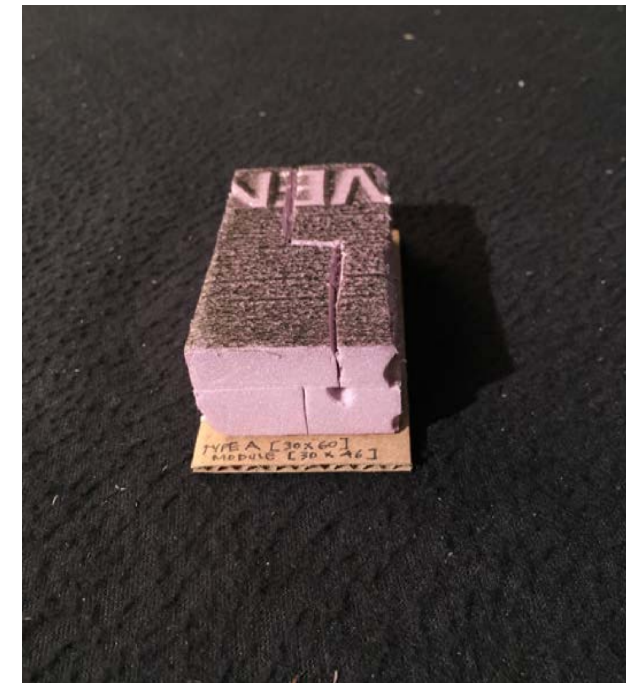
The principles incorporate aspects inspired through a study of form, vernacular, context, climate and society. It is essential these principles reflect the importance of community interaction while allowing for a sense of privacy in this dense urban fabric. The form and materiality used are local and help tackle the energy crisis by designing a more efficient building envelope.



TYPE A - 30' x 60'



TYPE B - 40' x 80'

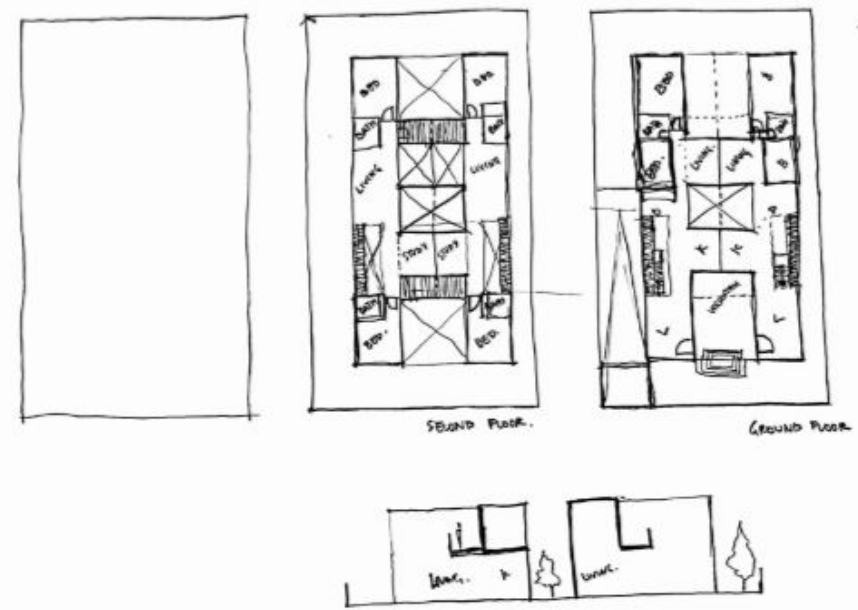


Foam models from the "Thesis Conceptual Review"

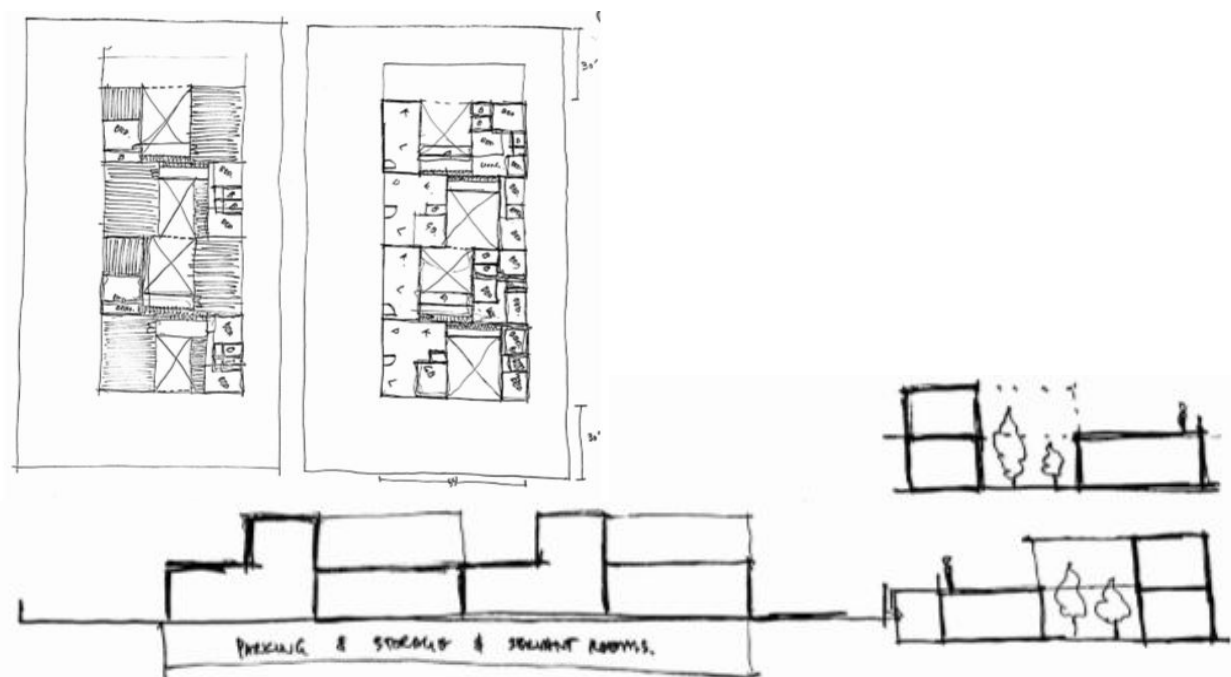


In order to tackle some of the economic issues of increased prices of rent and land in the city, more density was proposed to subsidize some of the costs. In Pakistan, the land and building of the house are self-funded. There are no subsidies or mortgages provided by the bank. In order to raise that kind of equity the home owner needs to eventually rent out a portion of the house. Due to the lack of awareness and funds architects are rarely employed by middle income families. This results in a triple decker with two or three level of apartments with neither family receiving much autonomy.

By creating an open source platform, those not investing the money in architects can refer to the matrix of options available on the Open Source Architecture – Islamabad website and select their preferable models creating a level of awareness building in the city and providing a resource for building more responsible architecture.



TYPE C - 50' x 90'



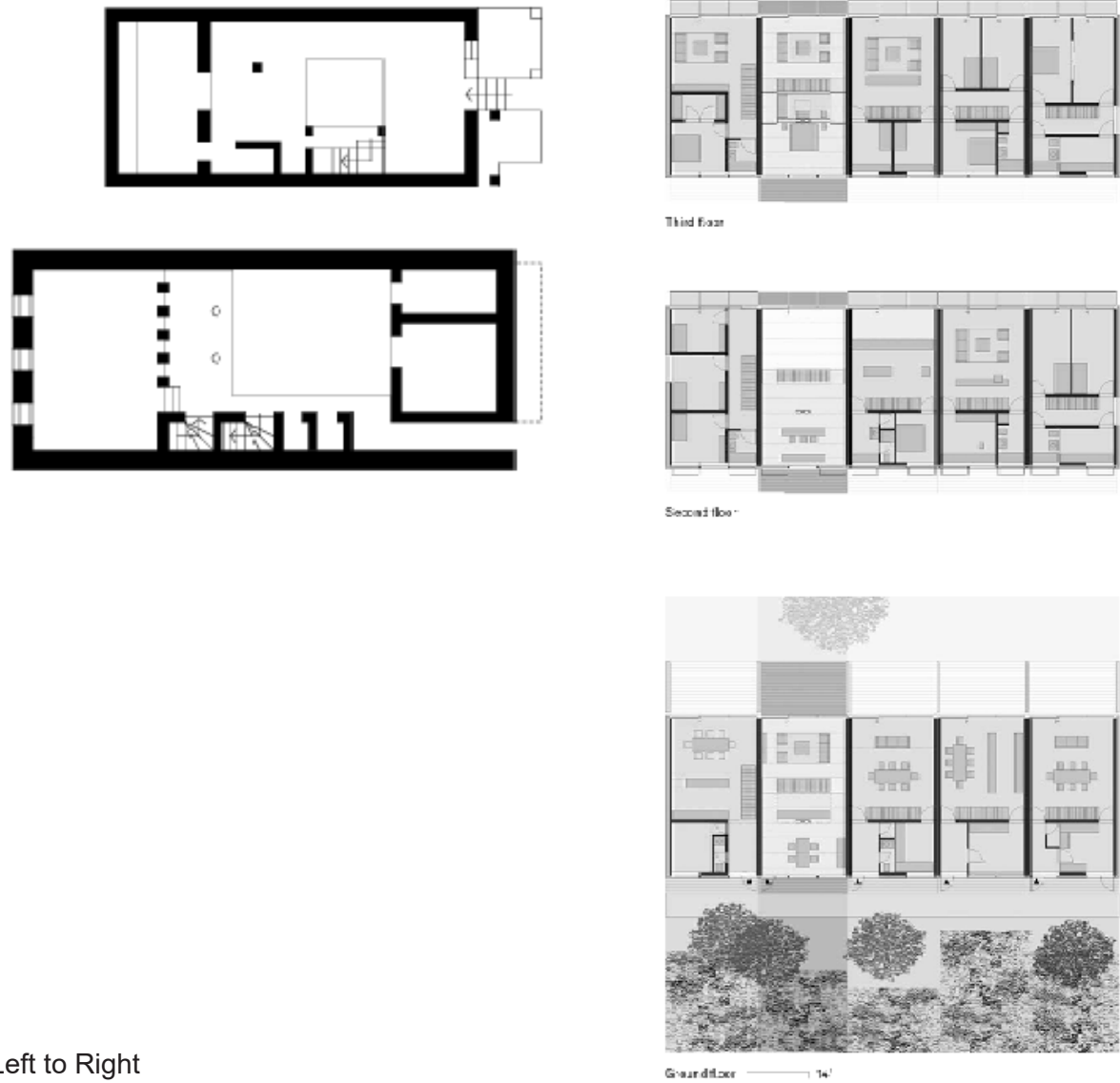
TYPE D - 100' x 180'



Foam models from the "Thesis Conceptual Review"



The initial studies helped shape the spatial quality of the new housing to create two autonomous single family units with car parking, private garden spaces and shared spaces within each of the plot types. The smaller types A through C were configured for two households with courtyards, terraces, out-kitchens and parking. Whereas, the largest plot, Type D became an amalgamation of the smaller types placed horizontally on the site to house multiple units, typically with parking, maid's rooms and services in the basement.



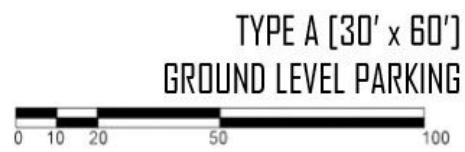
Left to Right

India Urban House (Friedman, *Narrow Houses*)  
 Islamic Urban House (Friedman, *Narrow Houses*)

Wohnpark am Betzenberg, AV1 Architekten  
 (Friedman, *Narrow Houses*)



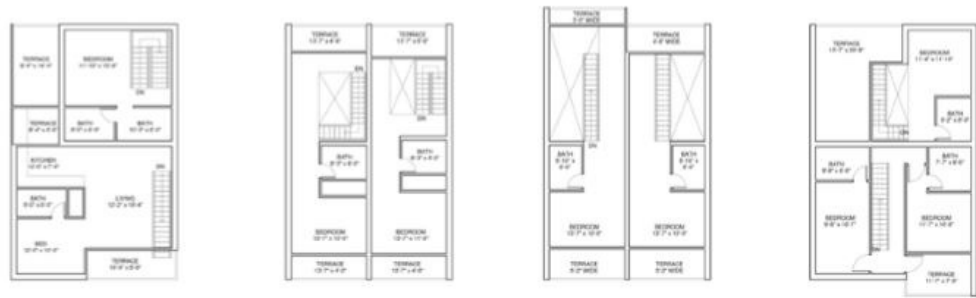




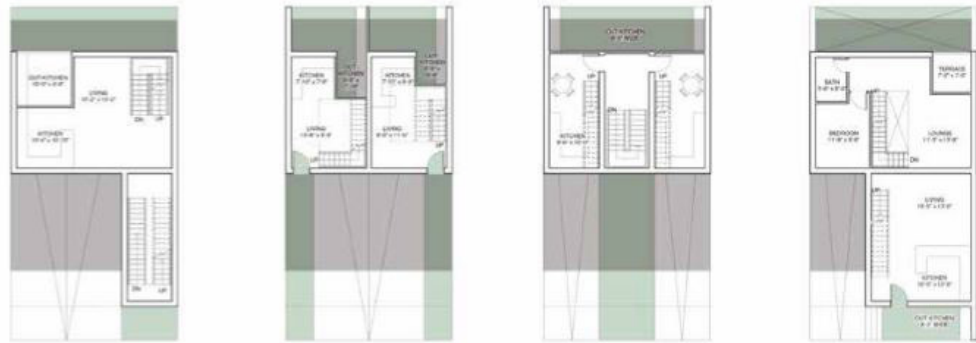
Basement Parking  
Adjacent-side  
Adjacent-row  
Adjacent-center  
Adjacent-out

TYPE A [30' x 60']  
BASEMENT PARKING

LEVEL 2



GROUND LEVEL



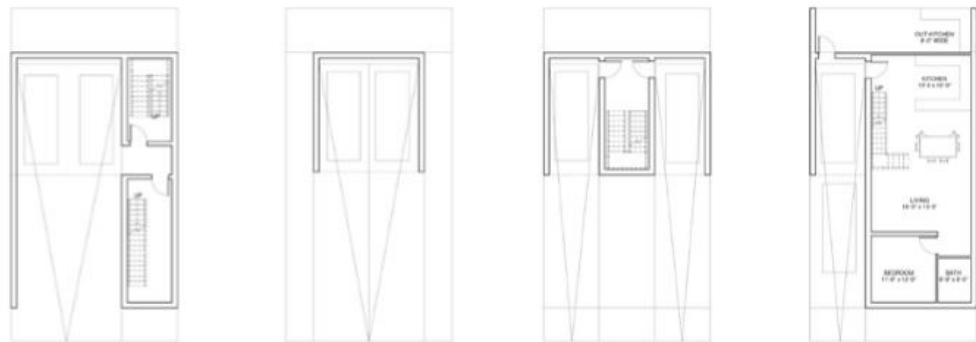
ADJACENT-side

ADJACENT-center

ADJACENT-out

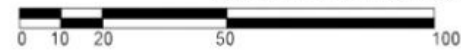
ADJACENT-row

BASEMENT

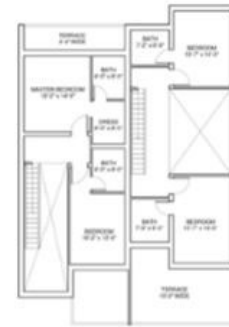


Split Level Parking  
 Adjacent-side  
 Adjacent-row  
 Adjacent-center  
 Adjacent-out

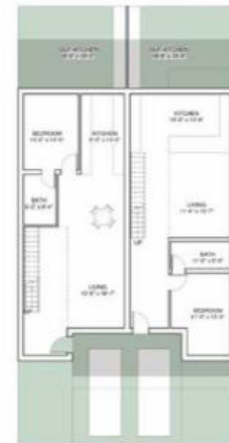
TYPE A [30' x 60']  
 SPLIT LEVEL PARKING



LEVEL 2



GROUND LEVEL



ADJACENT-in

Ground Level Parking  
 Adjacent-in  
 Adjacent-out  
 Adjacent-row  
 Adjacent-side

TYPE B [40' x 60']  
 GROUND LEVEL PARKING





LEVEL 2



L-ADJACENT-in    L-ADJACENT-out    ADJACENT-side    ADJACENT-row    L-ADJACENT-row

GROUND LEVEL



BASEMENT

Basement Parking  
L-Adjacent-in  
L-Adjacent-out  
Adjacent-side  
Adjacent-row  
L-Adjacent-row

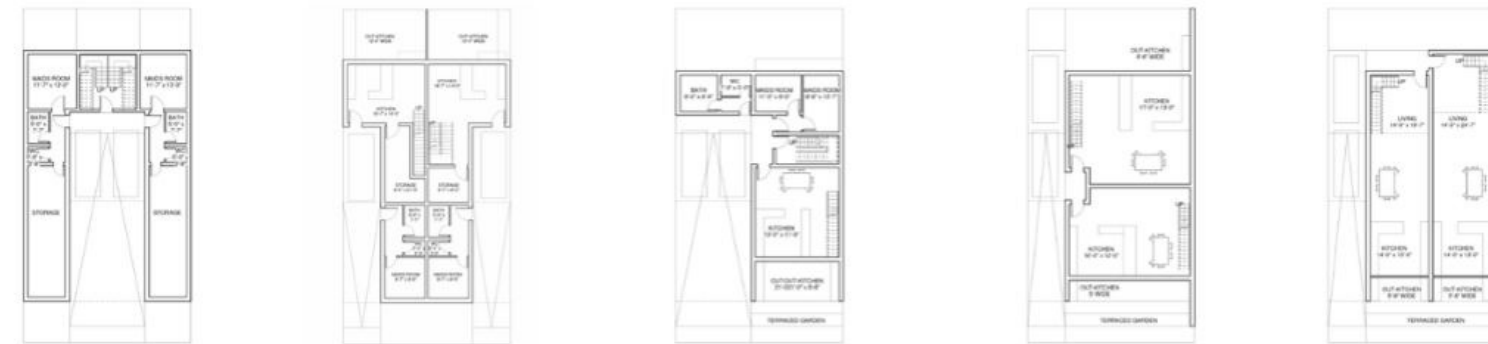
TYPE B [40' x 60']  
BASEMENT PARKING

LEVEL 2



L-ADJACENT-in    L-ADJACENT-out    ADJACENT-side    ADJACENT-row    L-ADJACENT-row

GROUND LEVEL



BASEMENT

Split Level Parking  
L-Adjacent-in  
L-Adjacent-out  
Adjacent-side  
Adjacent-row  
L-Adjacent-row

TYPE B [40' x 60']  
SPLIT LEVEL PARKING





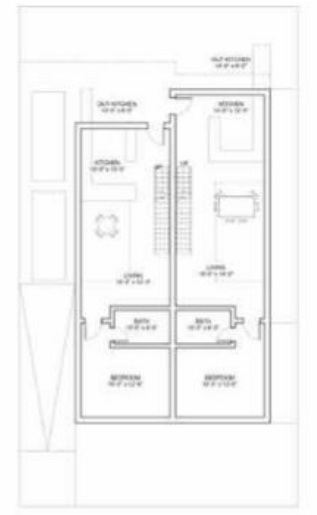
GROUND LEVEL

Ground Level Parking  
 Adjacent-row  
 Adjacent-side  
 Stacked-out  
 Adjacent-in  
 Equal-Adjacent-out  
 Adjacent-under

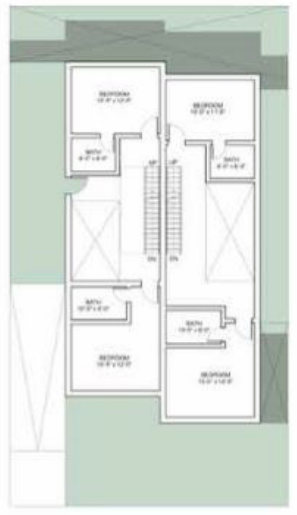
TYPE C (50' x 90')  
 GROUND LEVEL PARKING



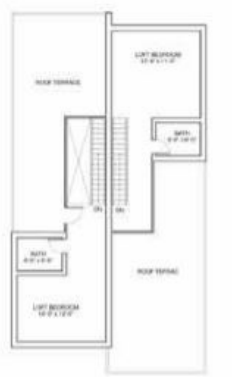
ADJACENT-row



BASEMENT



GROUND LEVEL

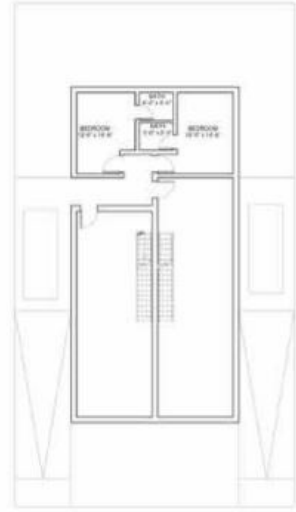


LEVEL 2

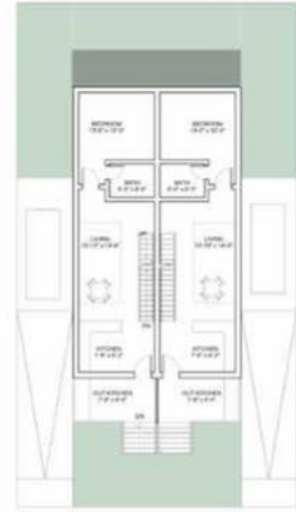
Basement Parking  
 Adjacent-row  
 Adjacent-out  
 Adjacent-in

TYPE C (50' x 90')  
 BASEMENT PARKING

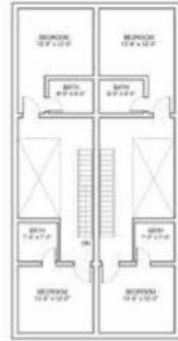
ADJACENT-row



BASEMENT

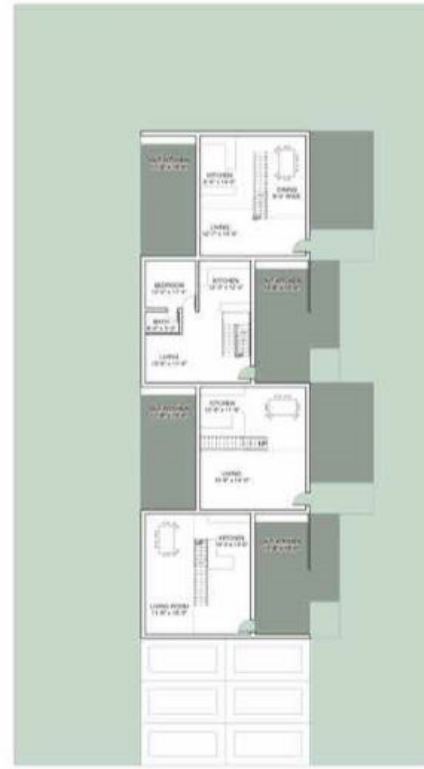


GROUND LEVEL



LEVEL 2

4-STAGGERED-front



GROUND LEVEL



LEVEL 2



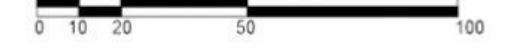
LEVEL 3

Basement Parking  
Adjacent-row  
Adjacent-out  
Adjacent-in

Ground Level Parking  
4-Staggered-front  
6-Row-front

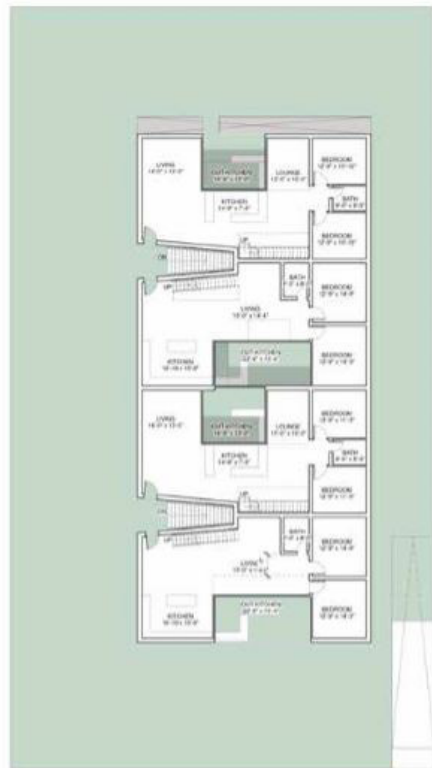
TYPE C (50' x 90')  
BASEMENT PARKING

TYPE D (100' x 180')  
GROUND LEVEL PARKING

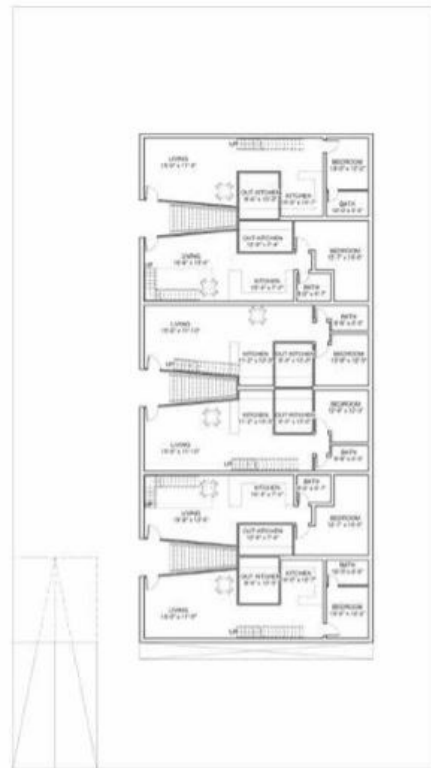


4-ROW-side

6-ROW-side



4-ROW-side-1ramp

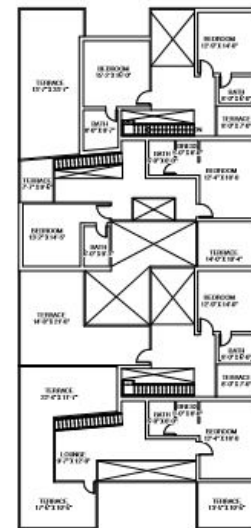


6-ROW-side-2ramps

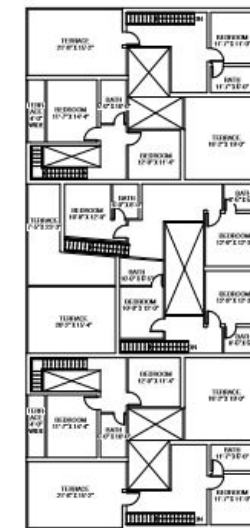
GROUND LEVEL

4-ROW-side

6-ROW-side



LEVEL 2



Basement Parking  
 4-Row-side-1ramp  
 6-Row-side-2ramps  
 6-Row-center-1ramp

TYPE D [100' x 180']  
 BASEMENT PARKING

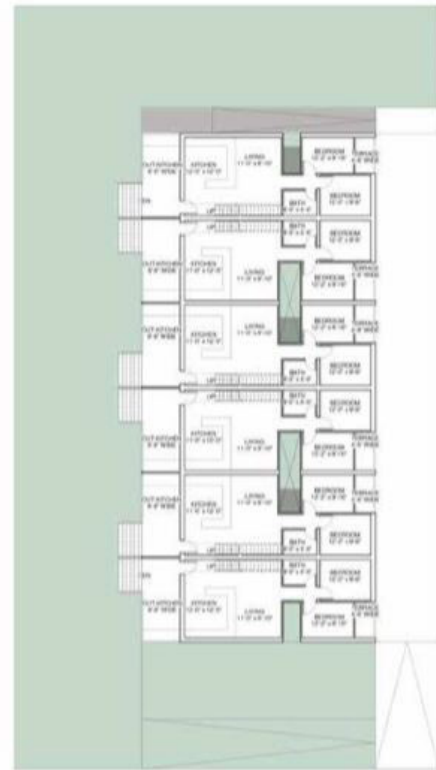
Basement Parking  
 4-Row-side-1ramp  
 6-Row-side-2ramps  
 6-Row-center-1ramp

TYPE D [100' x 180']  
 BASEMENT PARKING





6-ROW-side



6-ROW-side

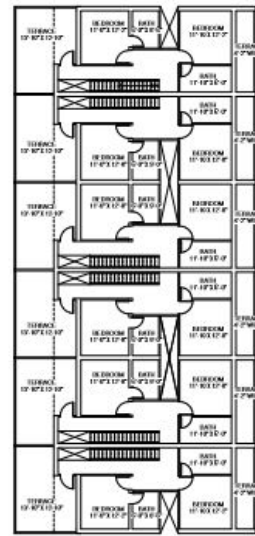


4-ROW-side

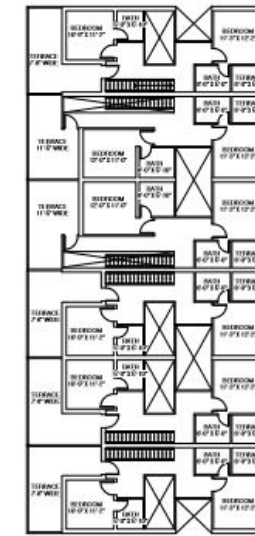


GROUND LEVEL

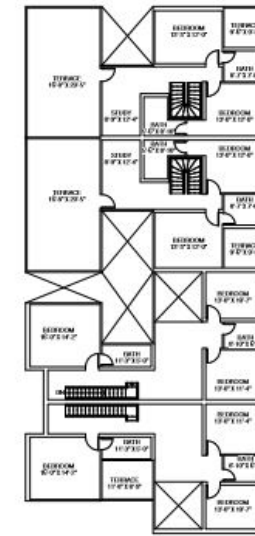
6-ROW-side



6-ROW-side



4-ROW-side



LEVEL 2

Split Level Parking  
6-Row-side-1ramp-12spaces  
6-Row-side-1ramp-10spaces  
4-Row-side-1ramp-7spaces

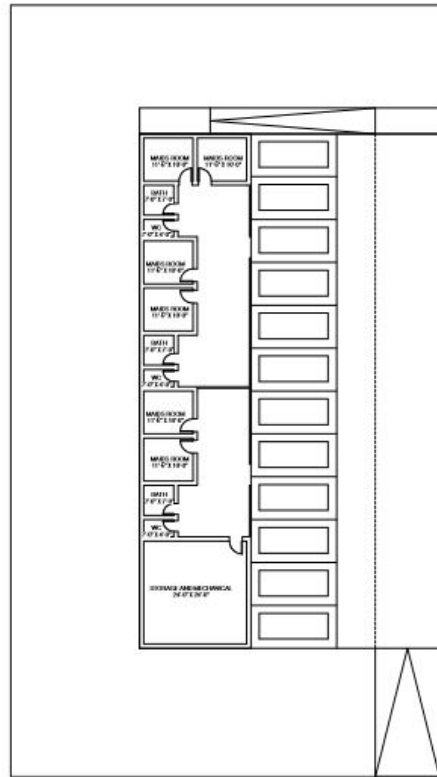
TYPE D [100' x 180']  
SPLIT LEVEL PARKING

Split Level Parking  
6-Row-side-1ramp-12spaces  
6-Row-side-1ramp-10spaces  
4-Row-side-1ramp-7spaces

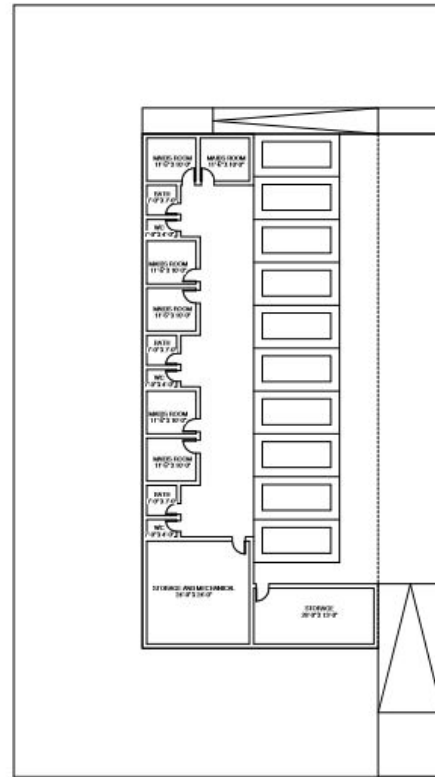
TYPE D [100' x 180']  
SPLIT LEVEL PARKING



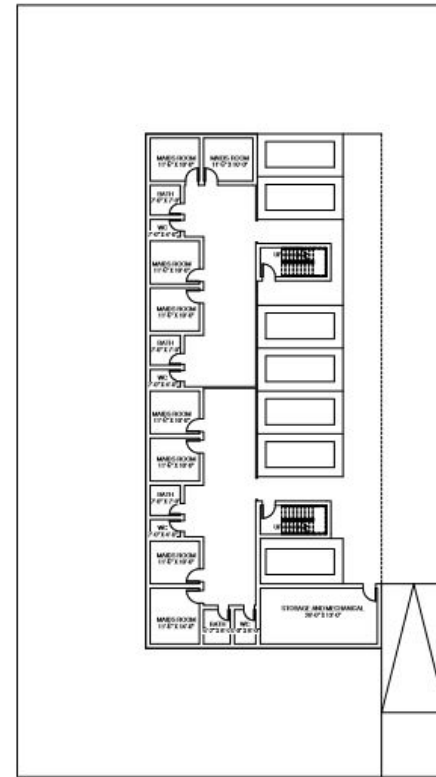
6-ROW-side



6-ROW-side



4-ROW-side



BASEMENT

Split Level Parking  
 6-Row-side-1ramp-12spaces  
 6-Row-side-1ramp-10spaces  
 4-Row-side-1ramp-7spaces

TYPE D (100' x 180')  
 SPLIT LEVEL PARKING





# 5 DESIGNER + BUILDER





DEFINING PRINCIPLES



## OUTSIDE SPACES

The importance of the interior courtyard spaces is reflected in the nature of both the environment of the city and its people. The city, inhabited by a predominantly Muslim population and from a relatively conservative culture personifies its characteristics in these exterior private spaces. The courtyard acts as a sanctuary for the residents allowing them to interact with nature while in the privacy of their own home, a space detached from the city's busy streets. The courtyards are an essential component of naturally ventilating the house. The fresh air circulates through the house and out through the courtyard which functions as a chimney by releasing rising warm air and drawing fresh air down. The light seeps into the courtyards functioning as light-wells for the levels below.

Left to Right

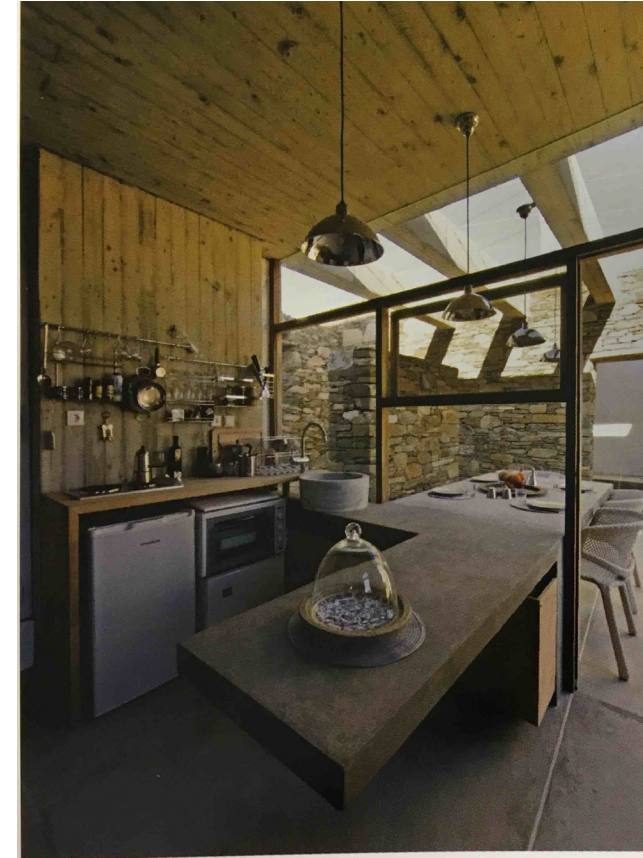
Eco-sustainability- Djuric Tardio Architectes  
(Friedman, *Sustainable*)

Vertical Farming

Out-kitchen (Friedman, *Sustainable*)

Courtyards (Friedman, *Sustainable*)

Green Roofs



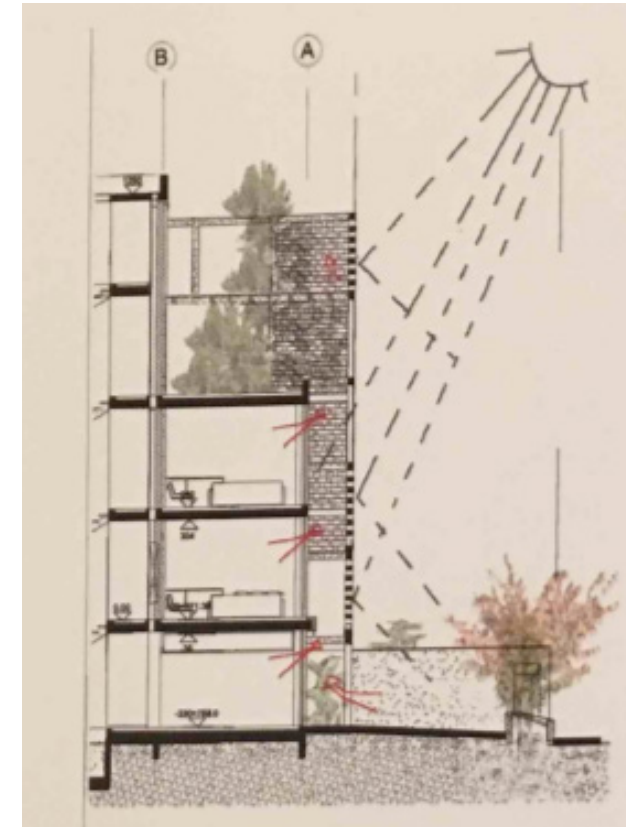
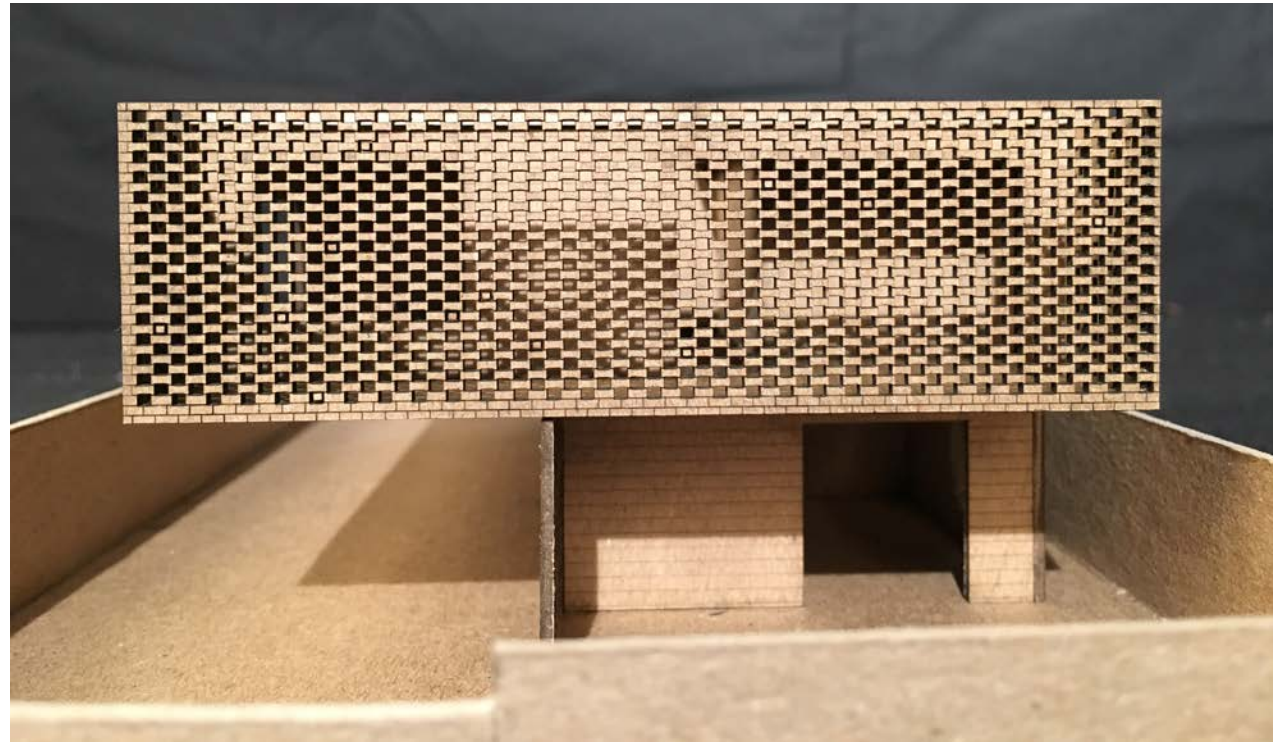
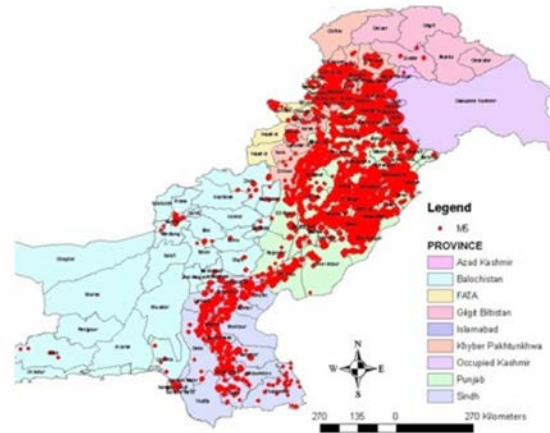
Unfortunately, due to the lack of space in the smaller plots and with increased density, the likelihood of encouraging people to add courtyards is dampened. The programmatic element of the out-kitchen is designed through a study of culture and tradition to incentivize the addition of courtyards. The courtyards would serve as the vernacular element *sahen*, this space was often used as an outdoor kitchen due to the potency of the aromatic spices in Pakistani food. Today, these kitchens are known as *grease kitchens* and are typically seen in larger houses. The out-kitchen works as an exterior extension of the indoor kitchen to allow for some cooking to be conducted outside seamlessly with the inside. The use of transformable glass panels allows for the residents to sit outside and enjoy the pleasant evenings in their courtyard dining area. Often times verandas serve this purpose, typically families will drink evening tea outside, the incorporation of the outside with the inside creates a private space for families to continue the tradition of outside tea time within a denser urban environment.



# BRICK SCREENS

The modesty of the culture is portrayed in the intricate nature of the brick veil which screens the residents from the city, creating a niche of their own in the country's capital. The brick screen with its numerous iterations allows the residents to represent a sense of themselves in the façade of their home. It is a contemporary interpretation for the changing local social and cultural traditions.

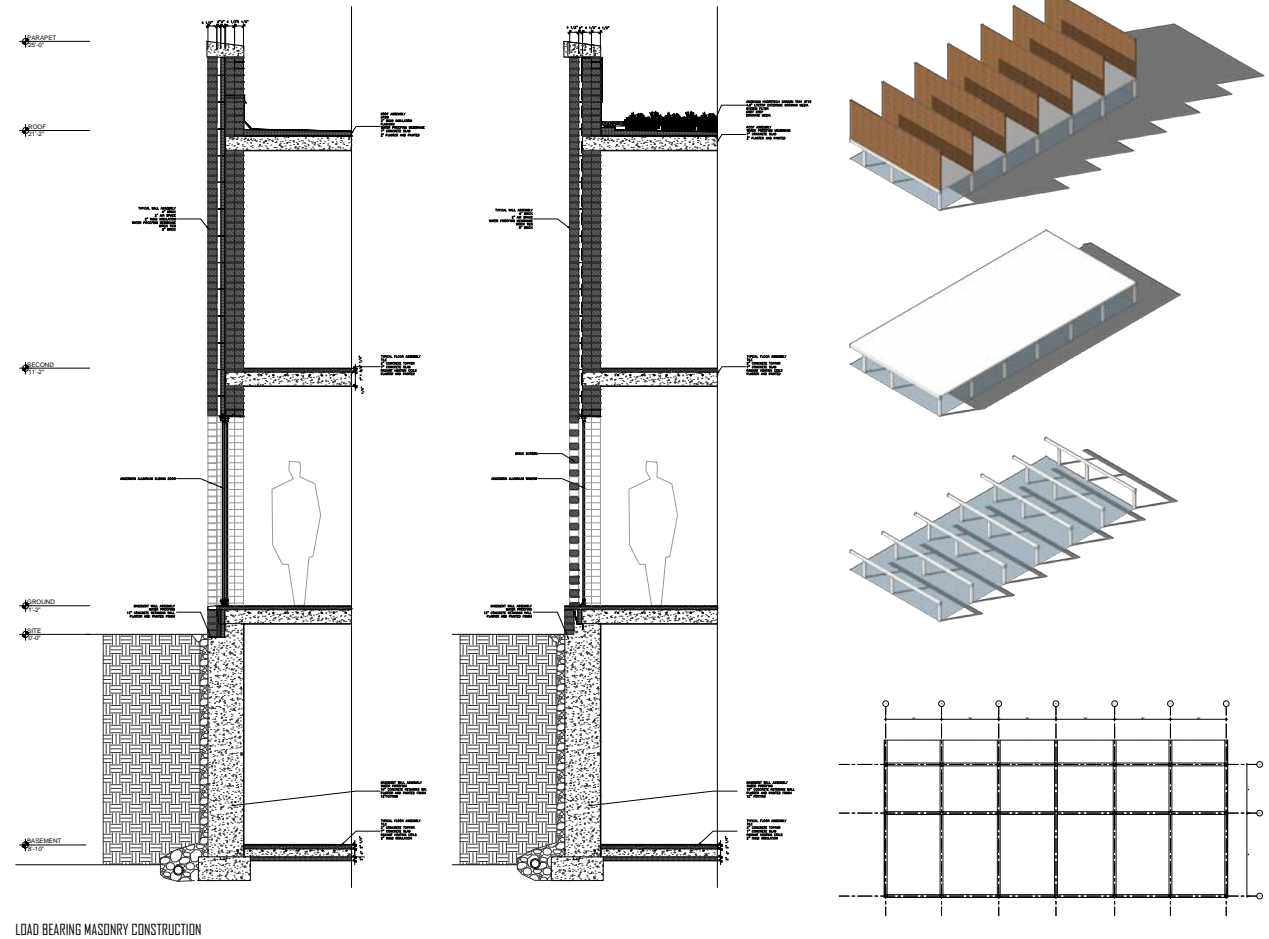
It not only serves as a visual barrier, much like the vernacular element *Jharoka*, it also acts as a shading device. The spacing in the lattice while providing views from the interior to the city also aids in controlling the interior temperature, shelters against the sun's heat, forceful winds and rain. Additionally, a constant flow of cooled fresh air is obtained from the spacing between the bricks, as the air passes through the narrow openings it allows for passive cooling.



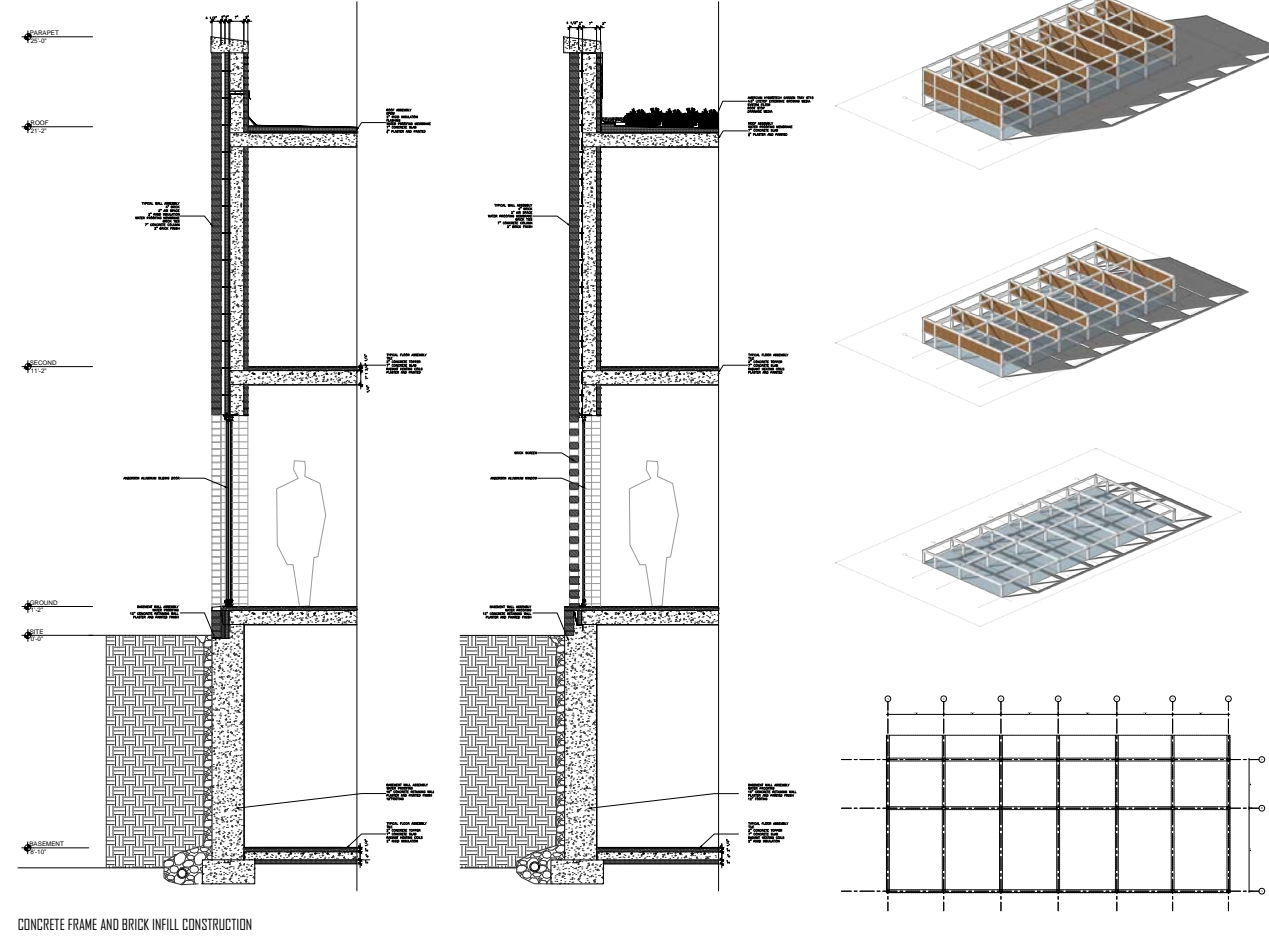
Left to Right  
 Spatial distribution of brick masonry buildings in Pakistan  
 Brick kiln factory, Lahore, Pakistan  
 Type C and D Model  
 Mashrabiya House, Beit Safafa, Palestine (Friedman, *Sustainable*)



It is typical for houses in Islamabad to be built from brick masonry, being locally manufactured it presents itself as the most affordable and sustainable option. The most prevalent construction technique for smaller plot types is the load bearing masonry wall system. However, larger developments usually employ the concrete frame and masonry infill construction technique. The concrete frame system creates a more resilient system in terms of earthquake resistance, whereas, the load-bearing system is more prone to shear forces caused by earthquakes. For options with basements, the basement would be concrete frame and then depending on the plot type the two options are available.



LOAD BEARING MASONRY CONSTRUCTION



CONCRETE FRAME AND BRICK INFILL CONSTRUCTION

Construction details for Loading Bearing Masonry Systems

Construction details for Concrete Frame and Brick Infill Systems

The wall section of the traditional construction system has been tweaked to provide a more efficient building envelope to tackle the energy crisis currently being faced in Islamabad. By introducing insulation into the wall system, it would help decrease the amount of energy lost through the walls. The brick screens over large window openings will also provide some relief. There are options for mass wall systems to provide other options without the use of insulation.

The provision for creating more green spaces in smaller plots lends to the need for designing roof gardens. The people of this city are fond of growing their own vegetables rooted in the tradition of the country of self-sufficiency. The roof gardens also act as a way to insulate the roof and aid with rainwater harvesting.

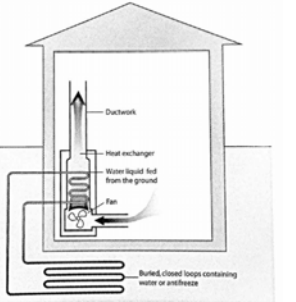
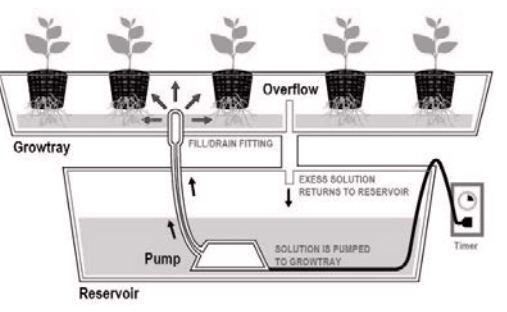
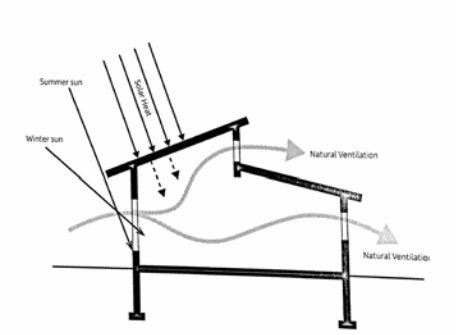
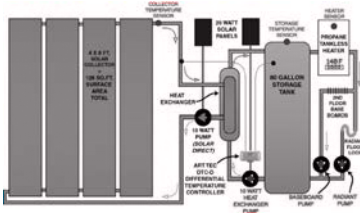
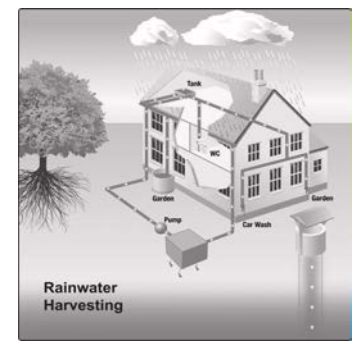
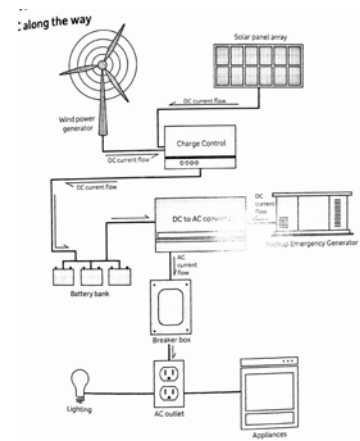


# RENEWABLE ENERGY

Renewable energy plays an essential role to find alternative energy solutions. The rainwater harvested can be treated through solar thermal technology to provide water for the appliances and the radiant floor heating system.

The solar panels on the roof help maintain the power of the house while off the national grid leading to the point where it may become fully self-sufficient. The proposition of hydroponic systems would allow for residents in dense cities to continue their passion for farming in the comfort of their own home.

Geothermal technology would be beneficial for larger neighborhoods of these new housing types to be built together to become more energy efficient and self-sufficient communities.



Solar Panels

Rainwater Harvesting

Solar Thermal Technology

Natural Ventilation

Hydroponic Farming Systems

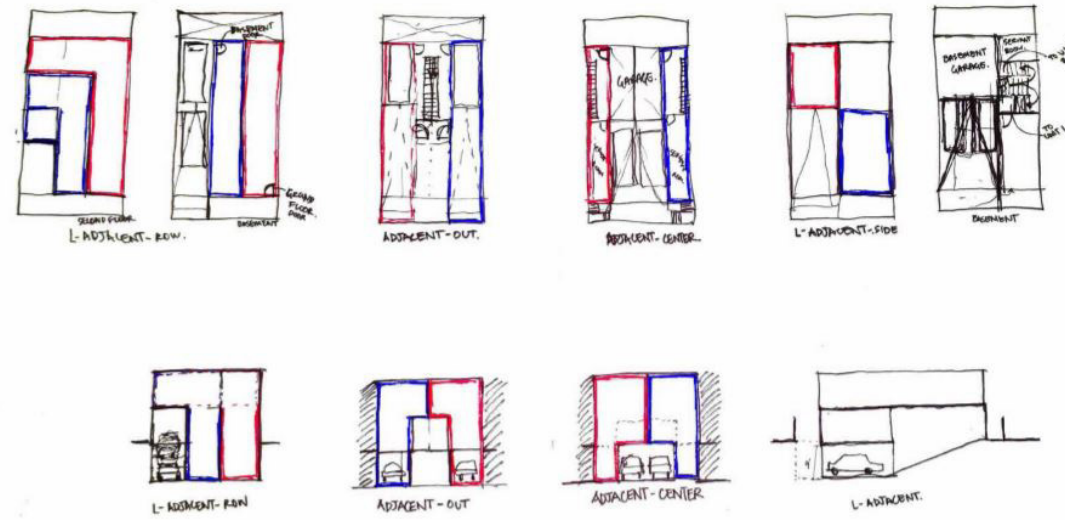
Geothermal Energy



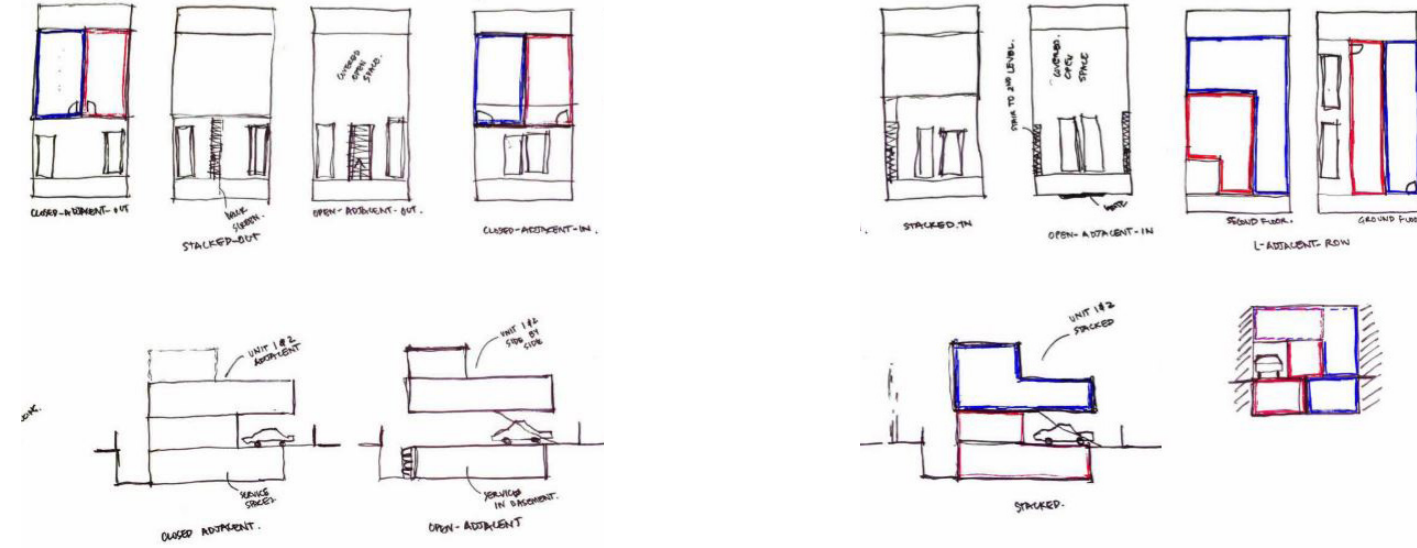


# OPEN SOURCE ARCHITECTURE

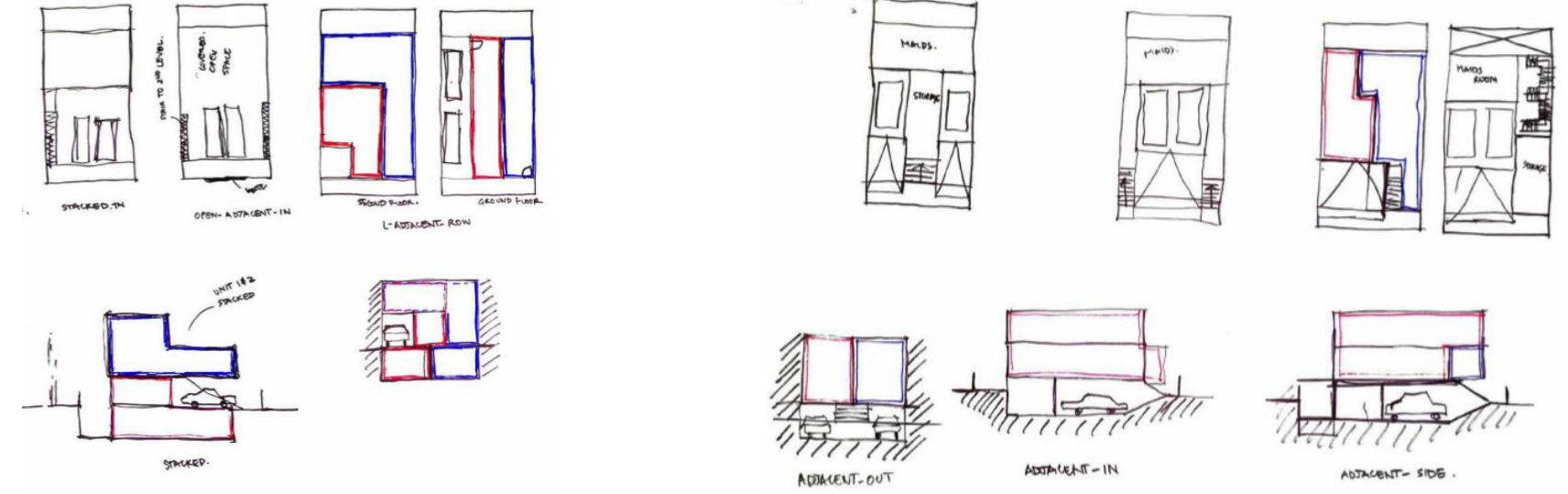
## TYPE A - GROUND LEVEL PARKING



## TYPE A - BASEMENT PARKING

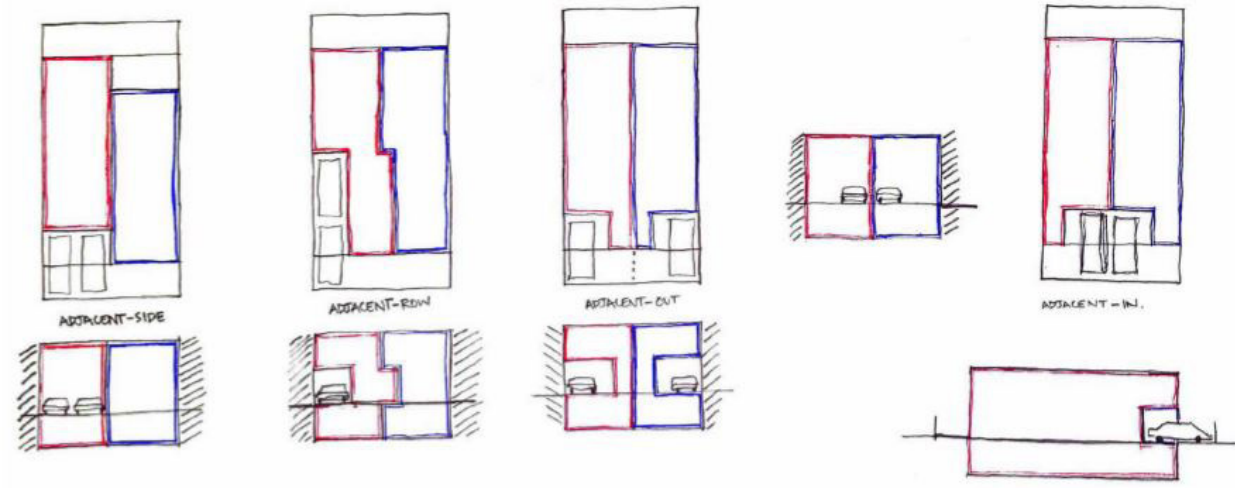


## TYPE A - SPLIT LEVEL PARKING

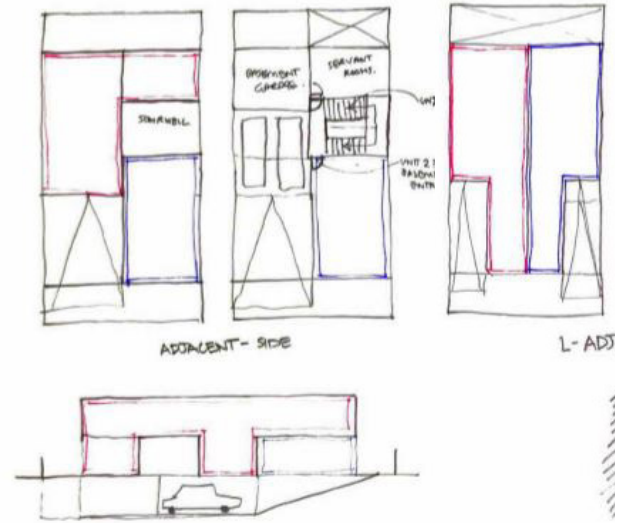




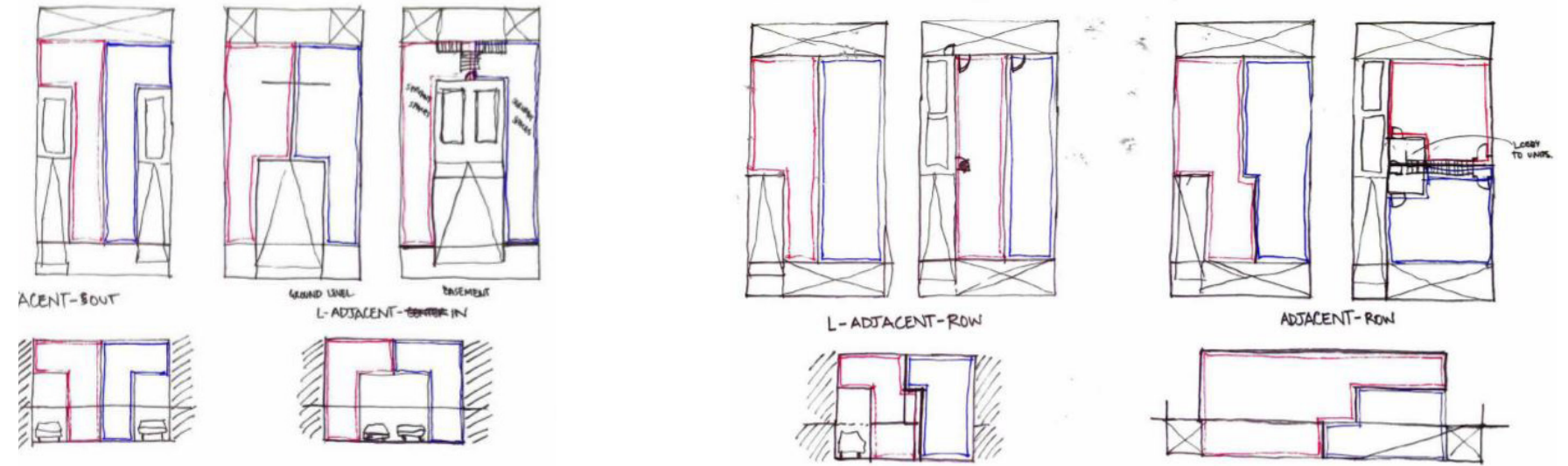
TYPE B - GROUND LEVEL PARKING



TYPE B - BASEMENT PARKING

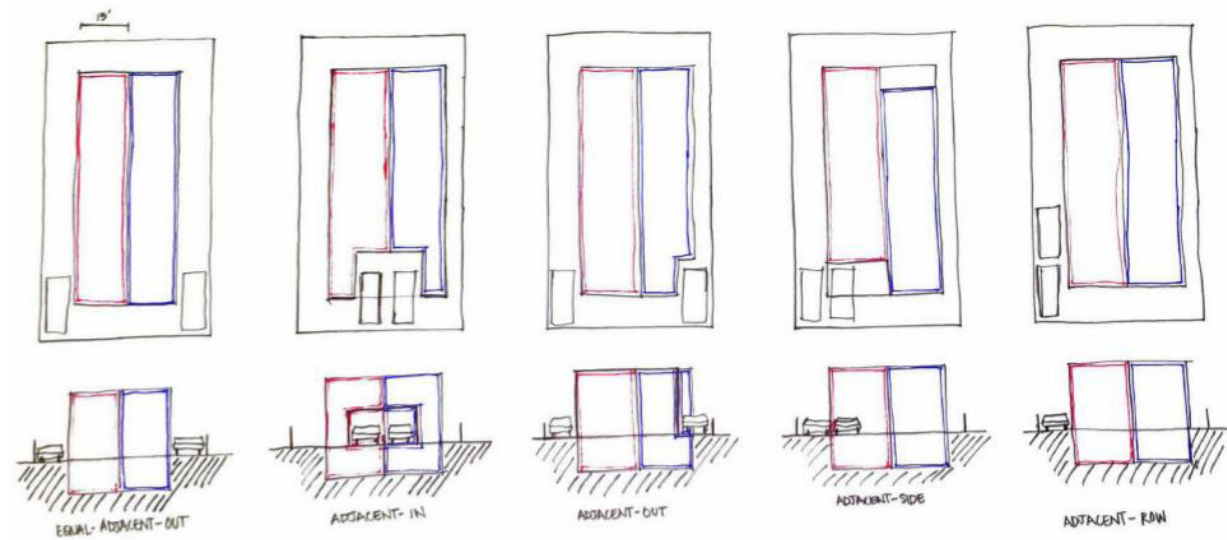


TYPE B - SPLIT LEVEL PARKING

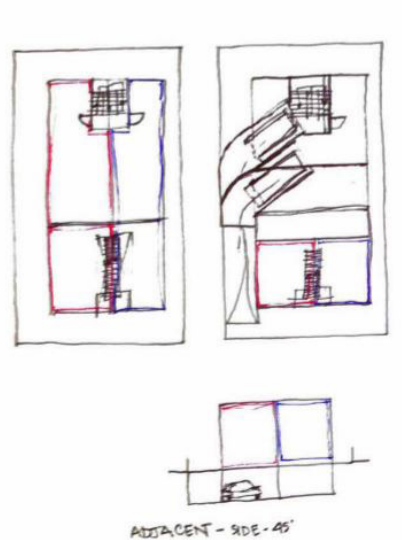




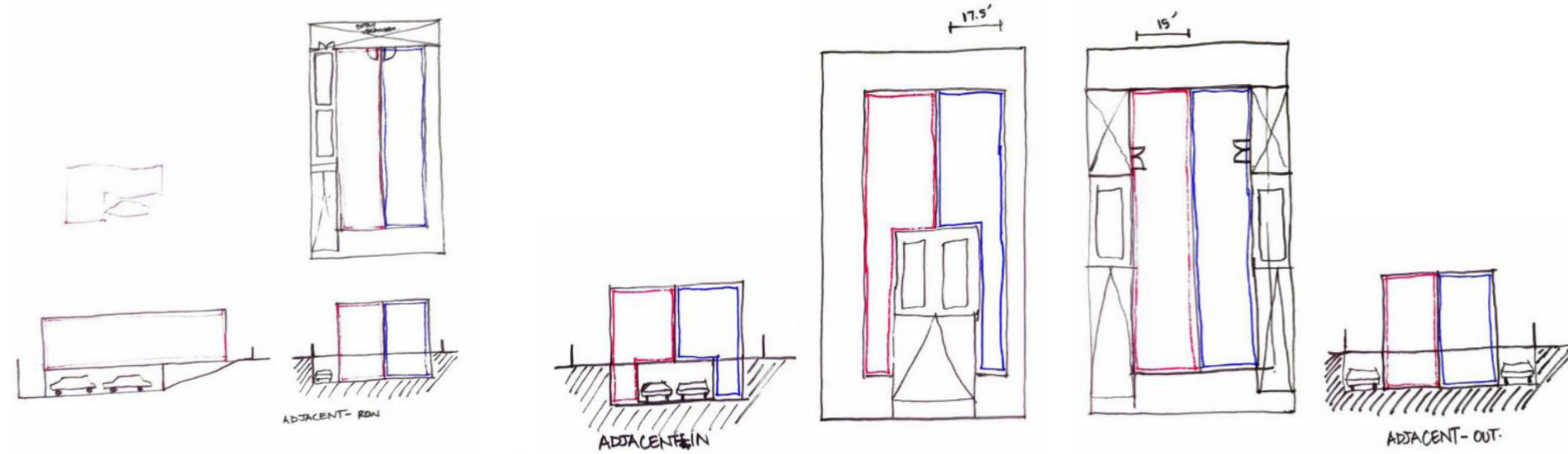
TYPE C - GROUND LEVEL PARKING



TYPE C - BASEMENT PARKING

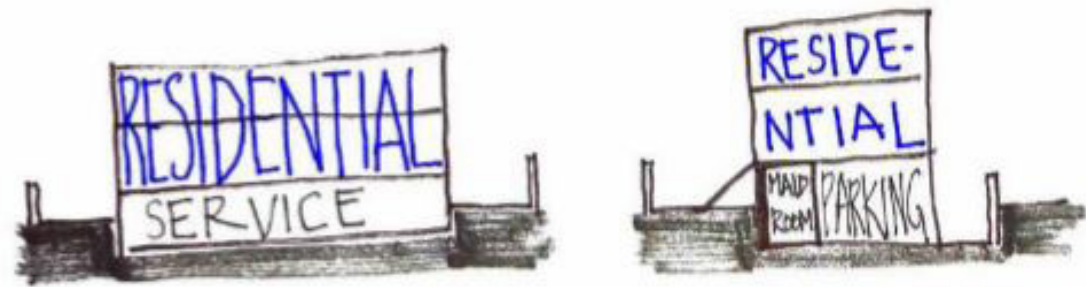


TYPE C - SPLIT LEVEL PARKING

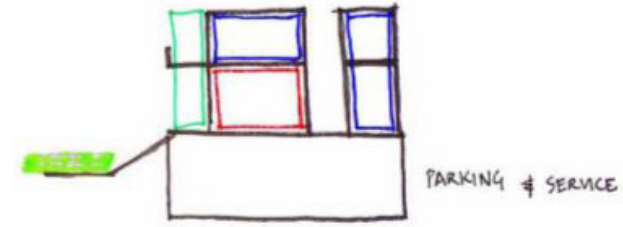
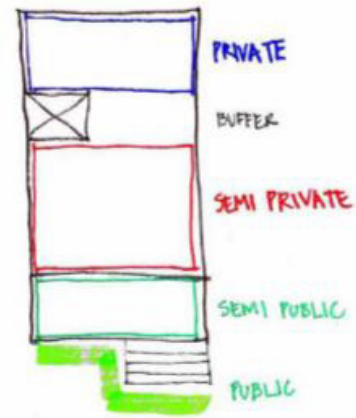




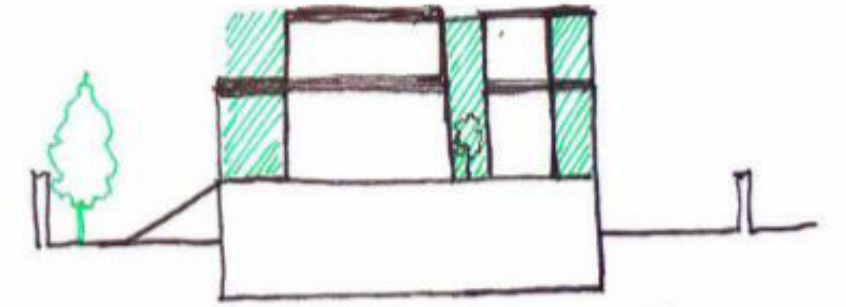
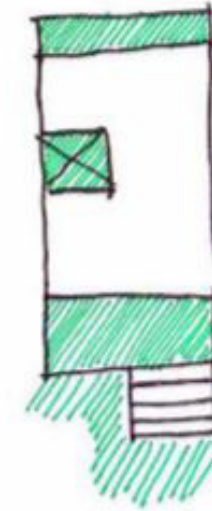
PROGRAMMATIC SPACES



PUBLIC vs. PRIVATE SPACES



GREEN AND EXTERIOR SPACES





The development phases of these neighborhoods would begin as infill for empty plots, eventually growing into larger neighborhood and communities. They would begin to address the street life and allow for more exterior spaces although in a denser environment. Older homes could be renovated to adapt to the new principles determined through the matrix. People with smaller plots in adjacent neighborhoods could come together and invest in renewable energy technology to create more sustainable neighborhoods.

An open source platform is a software for which the original source code is made freely available and may be redistributed and modified. This encourages an architectural discourse in the country that does not currently exist. This platform will help raise awareness in order to tackle the energy crisis by disseminating information for alternate energy sources and ways to create more energy efficient and sustainable architecture in Islamabad.



G-13 Existing Plots

Phase 1 - Scattered infill of empty plots

Phase 2 - Forming neighborhoods

Phase 3 - Renovate older plots to form larger neighborhoods



# 6 DESIGNER + BUILDER + ACTIVIST





CREATING THE MATRIX



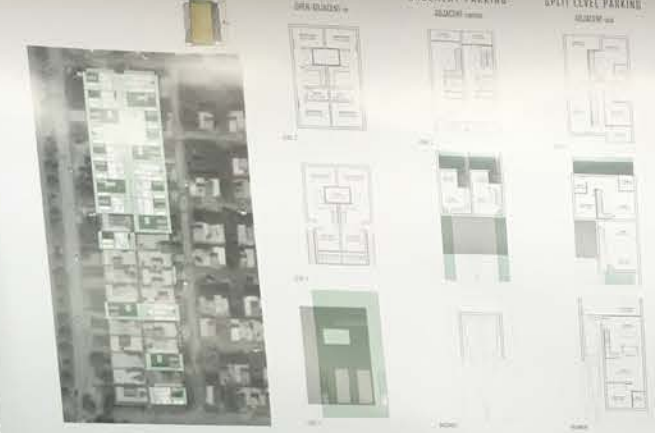
OPEN SOURCE ARCHITECTURE  
REDEFINING RESIDENTIAL ARCHITECTURE IN ISLAMABAD

MARIAM YAGUB



TYPE A - (30' x 80')

GROUND LEVEL PARKING  
BASEMENT PARKING  
SPLIT LEVEL PARKING



TYPE B - (40' x 80')

GROUND LEVEL PARKING  
BASEMENT PARKING  
SPLIT LEVEL PARKING



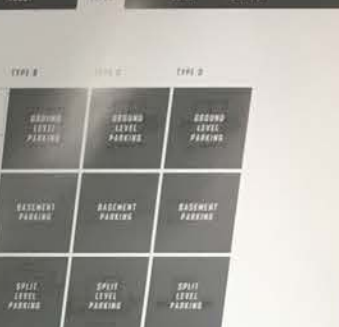
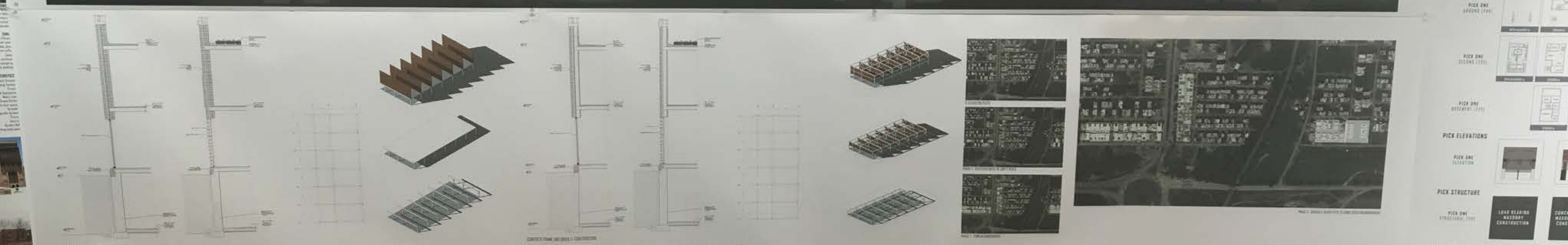
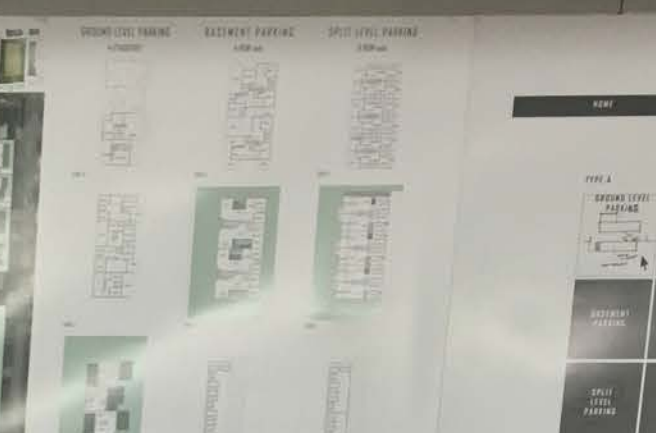
TYPE C - (50' x 90')

GROUND LEVEL PARKING  
BASEMENT PARKING  
SPLIT LEVEL PARKING



TYPE D - (100' x 100')

GROUND LEVEL PARKING  
BASEMENT PARKING  
SPLIT LEVEL PARKING





OPEN-SOURCE ARCHITECTURE  
ISLAMABAD



HOME ABOUT TYPES BUILD CONTACT

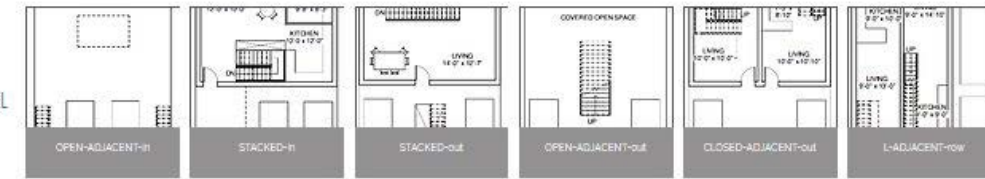
TYPE A	TYPE B	TYPE C	TYPE D
GROUND LEVEL PARKING	GROUND LEVEL PARKING	GROUND LEVEL PARKING	GROUND LEVEL PARKING
BASEMENT PARKING	BASEMENT PARKING	BASEMENT PARKING	BASEMENT PARKING
SPLIT LEVEL PARKING	SPLIT LEVEL PARKING	SPLIT LEVEL PARKING	SPLIT LEVEL PARKING

The organizing factor of the matrix stemmed from the imperative nature of the security issues faced in the city of Islamabad. Due to this, the car, a valuable asset, must be parked within the boundary walls of the plot. This was more difficult to implement in the smaller plot types due to the proposed increased density. The brick screen facades also helped with security issues creating a better design solution to the grilles that are currently added on the windows.

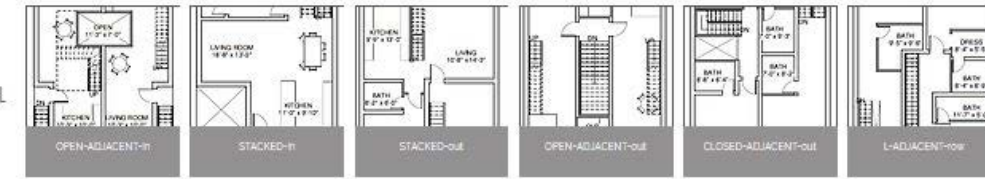
One of the cultural traditions stemmed by this lack of energy is the togetherness it fosters. Typically, the family room in the house is set up with a gas heater in the winter and a split air conditioner in the summer time bringing the family together around these essential luxuries during the peak seasons.

TYPE A [30' x 60']  
Ground Level Parking

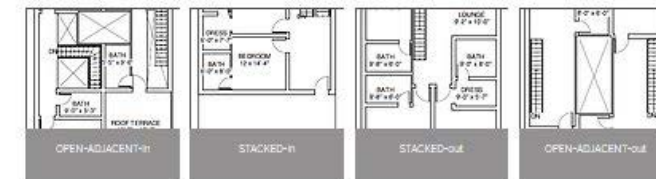
PICK ONE  
GROUND LEVEL



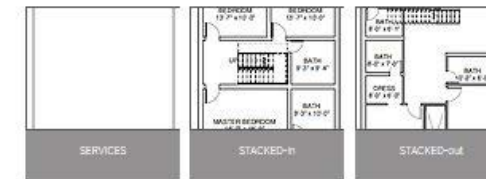
PICK ONE  
SECOND LEVEL



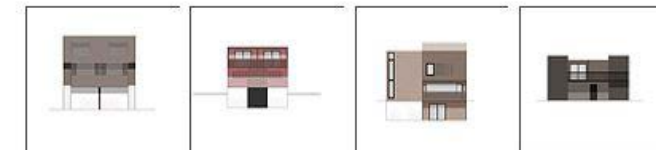
PICK ONE  
THIRD LEVEL



PICK ONE  
BASEMENT



PICK ONE  
ELEVATION



PICK ONE  
STRUCTURAL TYPE



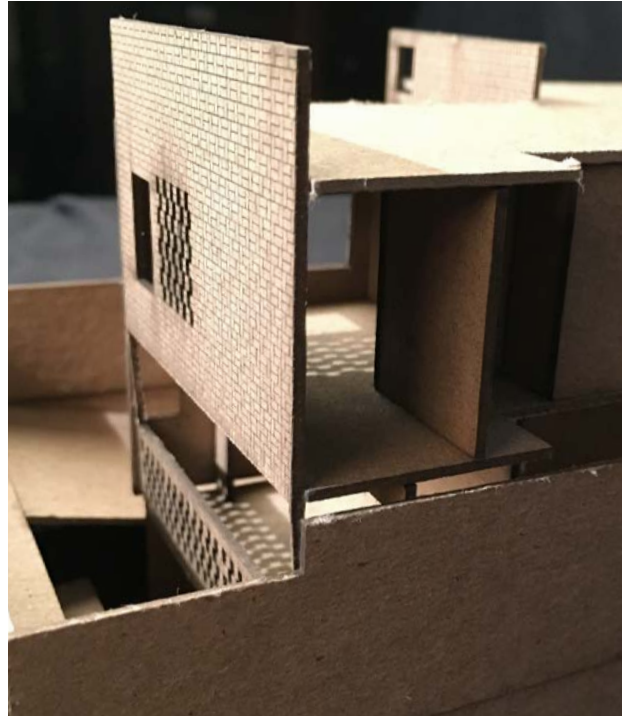
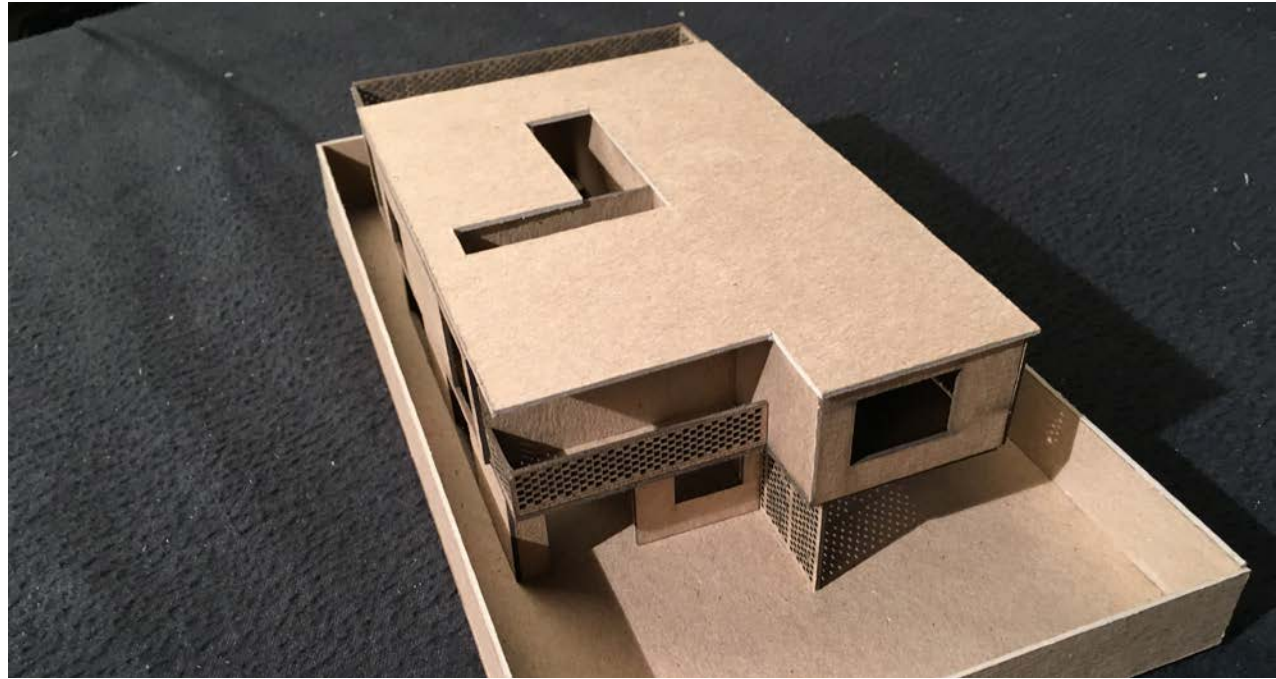
DOWNLOAD  
YOUR DESIGN



Throughout the design process the attention to these cultural and traditional details was what drove the layout of the houses. To address the traditional and cultural issues of privacy and segregation within the house in a smaller footprint the house was zoned into public, semi private and private spaces. The public tended to be on the lower floors towards the street edge of the house and the private spaces were located upstairs or towards the back of the house on the ground floor.

The matrix also lends itself as a tool to see examples of how the principles could be applied to certain plot types. The matrix is an open source platform allowing others to contribute to the layout options listed on the site. Moreover, the options in the matrix can be customized to the needs of the owner either through the website or on their own. The purpose is not to be a developer, but rather to propose change. And the best way to change is by building awareness at a grassroots level and implementing it.







## References

CDA Zoning and Regulations Code Book.

"Climate Data Processing Center." Pakistan Meteorological Department, n.d. Web.

Doxiadis, Constantinos Apostolou. "Islamabad, the Creation of a New Capital." *The Town Planning Review* 36.1 (1965): 1-36. Print.

"Eco-Sustainable House / Djuric Tardio Architectes." *ArchDaily*. N.p., 17 Apr. 2012. Web. 20 Apr. 2016.

"Facts & Statistics - Islamabad." *Facts & Statistics - Islamabad*. N.p., n.d. Web. 20 Dec. 2016.

Francis, Oloo, and Romana Basir. *Comparative Analysis of Solar Energy Potential in Kenya and Pakistan*. Oloo's EPortfolio. Univeristy of Salzburg, 17 Feb. 2013. Web.

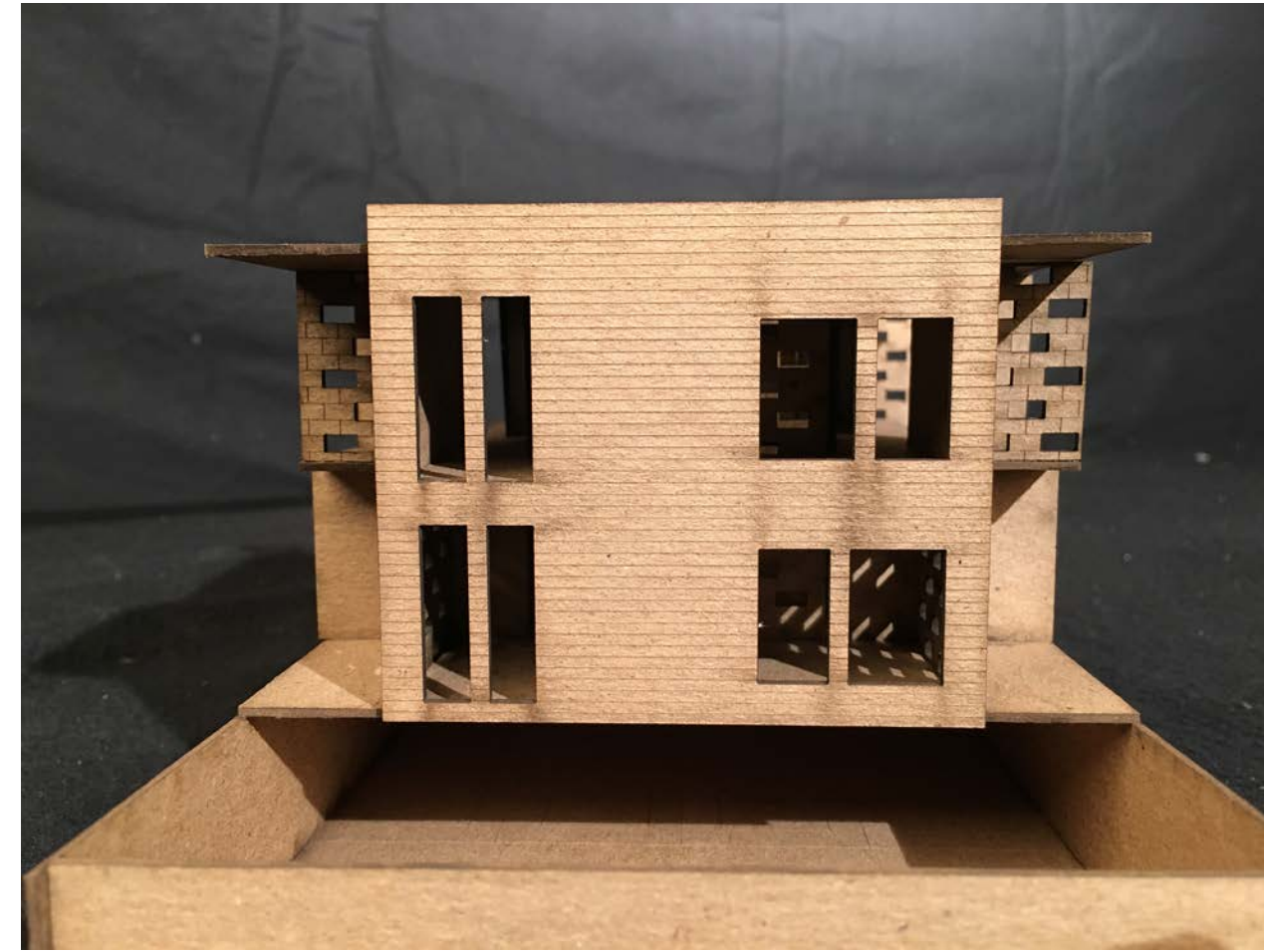
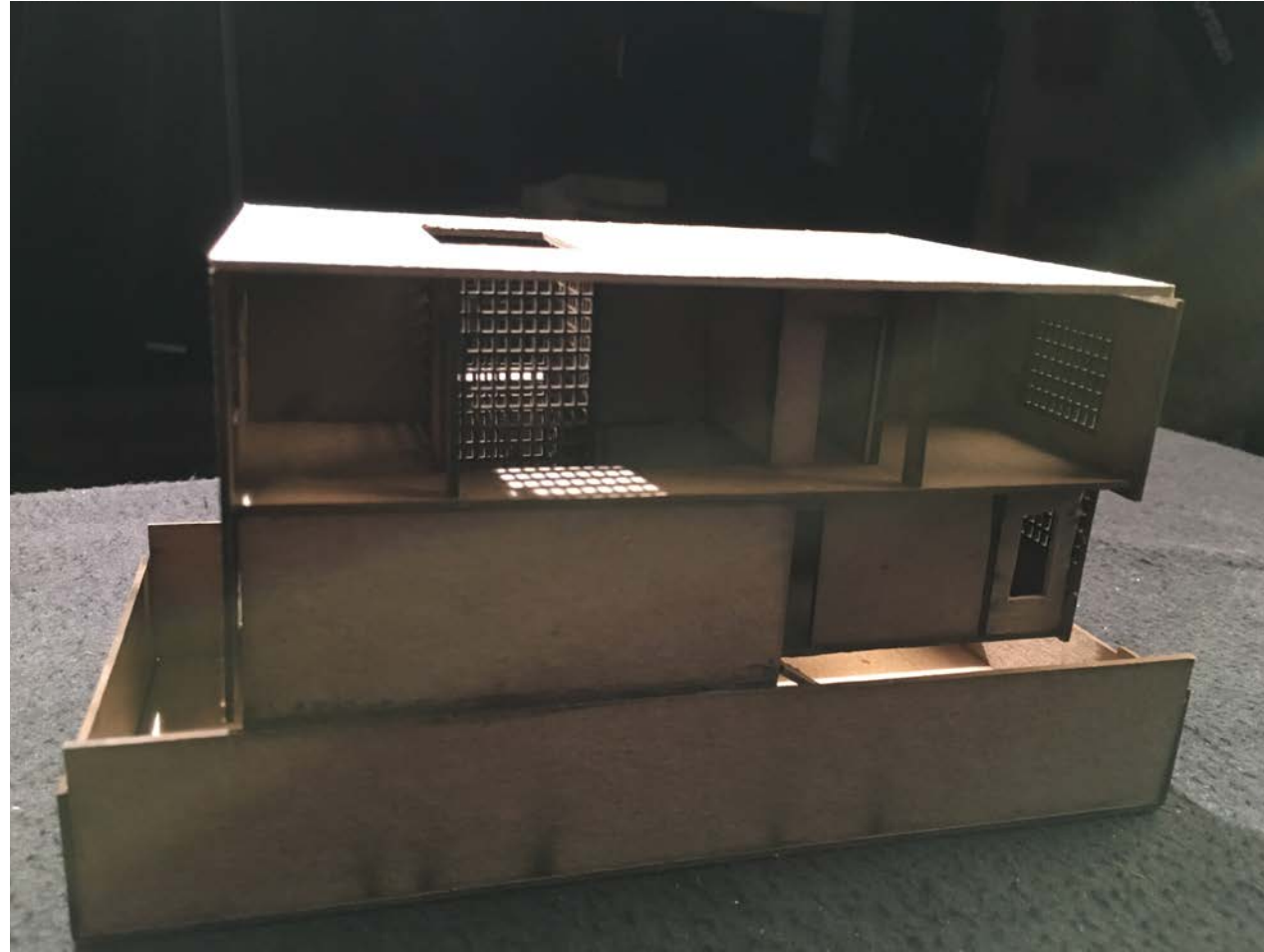
Friedman, Avi. *Narrow Houses: New Directions in Efficient Design*. New York, NY: Princeton Architectural, 2010. Print.

Friedman, Avi. *Sustainable: Houses with Small Footprints*. New York, NY: Rizzoli, 2015. Print.

Glover, William J. *Making Lahore Modern: Constructing and Imagining a Colonial City*. Minneapolis: U of Minnesota, 2008. 114-15. Print.

"Healdsburg Family Residence | Arkin Tilt Architects." *Healdsburg Family Residence | Arkin Tilt Architects*. N.p., n.d. Web. 20 Apr. 2016.

"Islamabad: Annual Weather Averages." *Weather Averages for Islamabad, Pakistan*. N.p., n.d. Web. 20 Dec. 2016.



Khan, Hasan-Uddin. *The Architecture of Habib Fida Ali: Buildings and Projects, 1965-2009*. Karachi: Liberty, 2010. Print.

Khan, M. A., R. A. Qureshi, S. A. Gillani, M. A. Ghufuran, A. Batool, and K. N. Sultana. "Invasive Species of Federal Capital Area Islamabad, Pakistan." *Pakistan Journal of Botany* 42.3 (2010): 1529-534. Quaid-i-Azam University. Web. <[http://www.pakbs.org/pjbot/PDFs/42\(3\)/PJB42\(3\)1529.pdf](http://www.pakbs.org/pjbot/PDFs/42(3)/PJB42(3)1529.pdf)>.

Lodi, Sarosh Hashmat, Abdul Jabbar Sangi, and Adam Abdullah. "Housing Report: Brick Masonry Construction in Pakistan." *World Housing Encyclopedia* 173 (2013): n. pag. Avery. Web.

Mohr, Robert Allen. "The People in the City of the Nation : Re-viewing Islamabad's Fifth Function." *Dspace@MIT*. N.p., 21 June 2009. Web. 16 Aug. 2016. <<https://dspace.mit.edu/handle/1721.1/49870?show=full>>.

Mumtaz, Kamil Khan. *Architecture in Pakistan*. Singapore: Concept Media, 1985. Print.

Mumtaz, Kamil Khan. *Modernity and Tradition: Contemporary Architecture in Pakistan*. Oxford: Oxford UP, 1999. Print.

Sinclair, Cameron. "My Wish: A Call for Open-source Architecture." *Cameron Sinclair*. TED, 12 Feb. 2006. Web. 16 Mar. 2016.

"The World Factbook: PAKISTAN." *Central Intelligence Agency*. Central Intelligence Agency, n.d. Web. 20 Dec. 2016.

"Wind and Weather Statistic Islamabad/Rawalpindi Airport." *Windfinder.com*. N.p., n.d. Web. 20 Dec. 2016.

