ISLAMABAD AND AUTOMOBILE DEPENDENCY;
A CONSEQUENCE OF MODERNIST URBAN PLANNING?

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A CONSEQUENCE OF MODERNIST URBAN PLANNING?**

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ABSTRACT

ISLAMABAD AND AUTOMOBILE DEPENDENCY; A CONSEQUENCE OF MODERNIST URBAN PLANNING?

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There has been an ongoing debate about how low-density sprawling development, promoted by Modernist planning, has resulted in an increased automobile dependency in these cities. Nowadays, many cities have been adopting more sustainable approaches to urban planning. Likewise, delegates severely discussed reducing automobile dependence in the Transport Planning Dialogue held under the United Nations Commission on Sustainable Development. They widely recognized that integrating work, shopping, and community services with residential neighbourhoods in cities can reduce travel demands in the town. Although these policies are widely known, in the 21st century, low-density urban areas still exist and produce enormous amounts of carbon emissions due to the distance residents travel daily to reach their work areas. Greater the distance to travel, the higher the dependence on automobiles.

The thesis aims to investigate this problem by exploring the relationship between Modernist urban planning and automobile dependency and looking at the common characteristics of modernist cities. It seeks to explore how Modernist planning leads to cities with low-density urban development by studying the example of Islamabad, the Capital of Pakistan. Furthermore, it analyzes the adaptive capacity of such cities

by examining Zone 5, the most affected area by automobile dependency and urban sprawl in Islamabad. Therefore, this research tests the hypothesis of whether automobile dependency is only a consequence of modernist planning in Islamabad or whether there are also other factors. Thus, besides the modernist planning effects, this research explores the relationship between low-density residential areas and private car ownership, along with understanding the stakeholders' role in automobile dependency.

Keywords: Modernist Urban Planning, Automobile Dependency, Sustainable Development, Transport Planning, Islamabad.

ÖZ

ISLAMABAD VE OTOMOBİL BAĞIMLILIĞI;

MODERNİST ŞEHİR PLANLAMASININ BİR SONUCU MU?

Faiz, Zahida
Yüksek Lisans, Kensel Tasarım, Şehir Bölge Planlama
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Düşük yoğunluklu kentsel gelişimimi teşvik eden Modernist planlama sonucunda, otomobil bağımlılığının artmasına yönelik tartışmalar uzun zamandır süregelmektedir. Günümüzde birçok şehir, kent planlarında daha sürdürülebilir yaklaşımlar benimsemektedir. Aynı şekilde, Birleşmiş Milletler Sürdürülebilir Kalkınma Komisyonu bünyesinde düzenlenen Ulaşım Planlaması Diyaloğu'nda delegeler otomobil bağımlılığını azaltmayı ciddi bir şekilde tartışmıştır. İş, alışveriş ve toplum hizmetlerinin şehirlerdeki yerleşim bölgeleriyle bütünleştirilmesinin şehir içi seyahat taleplerini azaltabileceğini büyük bir çoğunlukla kabul etmiştir. Bu politikalar yaygın olarak bilinmesine rağmen, 21. yüzyılda, düşük yoğunluklu kentsel alanlar hâlâ mevcuttur; ve sakinlerin iş alanlarına ulaşmak için her gün kat ettikleri mesafe nedeniyle çok büyük miktarlarda karbon salınımı üretilmektedir. Gidilecek mesafe arttıkça otomobillere olan bağımlılık da artmaktadır.

Bu tez, Modernist şehir planlaması ile otomobil bağımlılığı arasındaki ilişkiyi incelemeyi ve Modernist şehirlerin ortak özelliklerine bakarak bu sorunu araştırmayı amaçlamaktadır. Pakistan'ın Başkenti İslamabad örneğini inceleyerek Modernist planlamanın düşük yoğunluklu kentsel gelişime sahip şehirlere nasıl yol açtığını

keşfetmeye çalışmaktadır. Ayrıca, İslamabad'da otomobil bağımlılığı ve kentsel yayılmadan en çok etkilenen bölge olan 5. Bölge'yi inceleyerek bu tür şehirlerin uyum sağlama kapasitesini analiz etmekredir. Böylece, bu araştırma, otomobil bağımlılığının İslamabad'daki Modernist planlamanın bir sonucu olup olmadığı veya başka faktörlerin de olup olmadığı hipotezini test etmektedir. Bir başka deyişle, Modernist planlama etkilerinin yanı sıra, bu araştırma, paydaşların otomobil bağımlılığındaki rolünü anlamanın yanı sıra, düşük yoğunluklu yerleşim alanları ile özel araç sahipliği arasındaki ilişkiyi araştırmaktadır.

Anahtar Kelimeler: Modernist Şehir Planlaması, Otomobil Bağımlılığı, Sürdürülebilir Kalkınma, Ulaşım Planlaması, İslamabad.

To my family

ACKNOWLEDGMENTS

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ABBREVIATIONS

BRT	Bus Rapid Transit
CDA	Capital Development Authority
ETO	Excise and Taxation Office
ICT	Islamabad Capital Territory
ITP	Islamabad Traffic Police
NADRA	National Database and Registration Authority
NMT	Non-motorized Transport
PBS	Pakistan Bureau of Statistics
PWD	Pakistan Public Works Department
TOD	Transit-oriented Development

CHAPTER 1

INTRODUCTION

1.1 Identification of the Research problem

The modernist cities of the twentieth century had aimed to transform an unwanted present by means of an imagined future by focusing on sustainable design practices. This thesis aims to investigate the elements in these modern cities, which rendered them unsustainable, in contrast to the way these cities were envisioned and the direction in which they are now expanding.

Modernist cities are expected to follow a footprint, where the growth is predicted. Despite this, there are major examples of modernist cities around the world which deviated from their original plan and expanded organically owing to various factors. Automobile dependency in modernist cities has come as a contrast to how they were envisaged; the cities did not expand as expected making the centres low in density. Hence, the hypothesis could be explored that whether modernist planned cities promote automobile dependency through their characteristic of zonal planning? This thesis explores the relationship of automobile dependency and modernist planning by understanding the morphology of Pakistan's capital Islamabad, designed on modernist principles by Doxiadias in the 1960s.

From the early examples of modernist urban planning in the 1800s, wide boulevards were a characteristic feature, as seen in the remodeling of medieval streets in Paris by Georges-Eugene Haussman (History of Urban Planning, 2022). This was followed by the Modern zoning legislation, a characteristic of all modernist planned cities, originated In Prussia, Germany as a result of protests by citizens on deteriorating environmental conditions as a result of uncontrolled buildup of inner

city factories and housing after the Franco-Prussian war (1870-1871). Other cities in USA, Britain and Scandinavia followed course, and moved towards organized cities by zoning them according to functions for the betterment of Public health (Ben-Joseph, 2012).

There has been an ongoing debate that how low-density sprawling development, promoted by the modernist planning, has resulted in an increased automobile dependency in these cities. Sherif Y. Razak has studied the case of Abuja, Nigeria, built on the Classical Modernist Planning, which has increased the growth of suburbs and resulted in automobile dependence. As mentioned Razak in a Conference Paper for Urban Transport 2013,

> *"The implicit 'predict and provide' approach of building and expansion of roads to ease congestion continued to skew investments on transportation towards permitting private automobile ownership and use at the expense of public transportation."* (Razak, 2013).

In a similar study, Peter Newman and Jeffrey Kenworthy noted that the residents of American cities consumed nearly four times as much fuel as the more compact European cities and ten times that of three compact westernized Asian cities, Hong Kong, Singapore and Tokyo (Newman K. , 1989). An analysis on their data by John Holtzclaw suggests that driving is reduced 30 percent every time density doubles and that even sprawling suburban areas would benefit from only a modest increase in density (Holtzclaw et al., 2002).

This approach, however cannot be completely applied to Islamabad, as the capital city was developed as a multi-nuclei, with each sector of 2km x 2km having a Sector Centre, providing all the basic amenities, hence producing self-sufficient neighborhoods (Figure 1.1). The sector center is the core of a sector dividing each of these units into 4 equally sized parts, which in reality did not work as expected, and the growth along east-west axis with a dynamic expansion is not achieved. Moreover sectors became such static and fixed that instead of expanding to further development areas, the population got stuck inside the grid boundaries and centers did not function

properly. Thus, this research attempts to explore the relationship between automobile dependency and modernist cities by looking at the morphology of Islamabad, where the original idea of sustainability had failed to be realized.
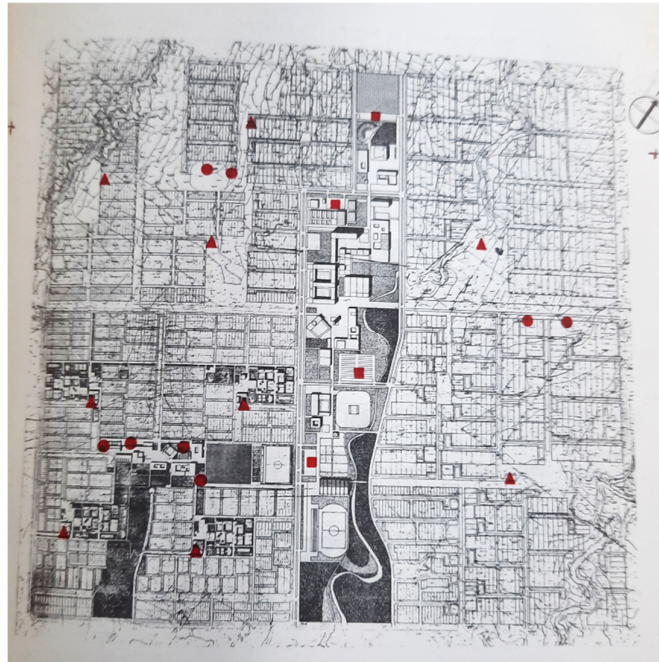
Figure 1.1. 2km x 2km Sector of Islamabad. Source: Islamabad Traffic Width of Roads and ROW Program and Plan,

With the world moving towards a more sustainable approach in urban planning, the idea of reducing dependence on automobiles has also been brought to light in the Transport Planning Dialogue held under the United Nations Commission on Sustainable Development, where the participants observed that travel demand could be reduced by improving urban planning by integrating work, shopping and community services with residential neighborhoods (United Nations, 2001).

Lack of adaptive capacity in modernist plans has been discussed extensively in various studies. One of the reasons of this failure is the rigid zoning, which fails to accomodate addition of new land use that was not anticipated in the orignal masterplan. Similarly, an analysis of zoning in modernist plans does show that they

somehow produce low-density areas. This in turn leads to suburban sprawl and increased automobile dependency to cater to far-fetched areas.

In this research, zoning is discussed as a major characteristic in modernist plans seen throughout the cities. These rigid regulations often inhibit the city growth and makes the plan deviate from the original anticipated growth patterns. It has been observed that in modernist planning, the original masterplan with all its regulations is seen as an artefact[1] that that accommodates no modification whatsoever; neglecting the adaptions that it must go through to sustain the present day and future needs of citizens.

While modernist plans are envisioned as sustainable solutions to urban planning, the study questions their major characteristics that often render them unsustainable. The research also looks at the major characteristic of modernist zoning which leads to low-density and suburban development making automobile dependency a norm in such areas. It also examines the role of stakeholders who contribute to policies that could make the original plan work and adapt to the present day conditions. It also explores the relationship between modernist plans and low density? Why zoning in modernist plans make cities growth static and confine their land use? How do the stakeholders perceive unsustainability of these cities? Do modernist plans encourage growth of suburbs? Is automobile dependency seen as economic growth in modernist cities? What are the stakeholders who determine the modes of transport in these cities?

These questions not only examine the role of modernist plans in making a city automobile dependent but also at the stakeholders who actively contribute to such a situation. Therefore, it is important to explore all the relationships to understand the phenomena of automobile dependency and the factors that lead to it. Moreover, it is important to understand that why a city[2], that was originally imagined to be a

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[1] (Tariq, 2020)
[2] Islamabad

sustainable Dynapolis[3], deviated from its original idea. Was there a problem in its adaptive capacity or did the initial plan imagined a utopia of sustainable neighborhoods through rigid zoning and pre-determined land use? This research also explores the illegal residential areas that have sprouted in and near Zone 5 of Islamabad as a result of the rigid zoning policies in the centre. The study of these areas will help in understanding the role of stakeholders and land use causing automobile dependency in cities and making them unsustainable which is a topic of concern in current times.

1.2   Scope of the Research

Islamabad is the Federal Capital of Pakistan, designed as a planned city in 1960s by Greek architect Dr. C.A. Doxiadis (Figure:1.2). Imagined as a model for "A City of The Future", Islamabad is one of the most prominent capitals built after WWII on modernist principles, inspired by the Athens Charter. The modernist principles reflect in all layers of the capital; from the grid plan to zoning and from architecture to transport planning. It is to be noted that numerous times throughout the documents written by Doxiadis and his team for Islamabad, the city has been addressed as a "modern" capital. To date, it is the first of the only two planned cities in Pakistan; the second being Khalabat Township, made in early 1970s.

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[3] Term coined by C.A. Doxiadis meaning dynamic city or dynamic "polis." The ideal dynapolis is the city with a parabolic uni-directional growth, which can expand in space, and time.

Figure 1.2. Final Master Plan for Islamabad, 1960. Source: Capital Development Authority Archives, Iqbal Hall, G-7, Islamabad. (CDA, Master Plan- Background)

Islamabad's masterplan has a stark contrast to all the other cities of Pakistan. Where other cities show organic growth, irregular streets, high density residential areas, informal markets aka "bazaars" and a lack of green spaces, the Federal Capital is a representation of a modern city having far superior infrastructure and living conditions. Perhaps this is why the current site of Islamabad was chosen as the area to develop a modern capital by the then President, H.E. President Mohammed Ayub Khan in 1959, as it provided a satisfactory solution in terms of climate, culture and traditions, and was also near Rawalpindi, which could provide existing buildings, transportation and communication facilities, etc for the first phase of development.

The masterplan of Islamabad takes its alingment from the natural landscpae pattern as well as the man made features; which translate into two highways namely the Islamabad Highway and Murree Highway, forming the basic spine of the masterplan. Apart from these, two more highways bypassing the twin city of Rawalpindi were proposed (Figure 4.20). This lead to a basic system of four highways, which served

as a starting point for the Islamabad grid pattern. Furthermore, these axes formed a big square, defining not only the future transportation systems but also all major functions and landuse within the metropolitan area. This grid in essence formed the 2km x 2km Sector (Figure 1.3).
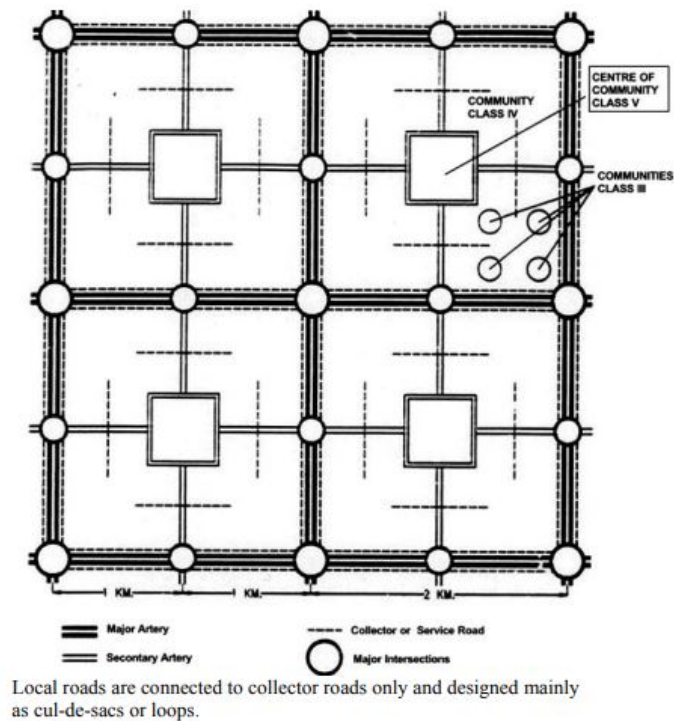
Figure 1.3. Road netwrok defining the basic unit of grid in Islamabad. Source: (Frantzeskakis I. M., 2009)

Islamabad is divided into five major zones, namely: Zone I, Zone II, Zone III, Zone IV, & Zone V. Zone I, being divided into sectors, is the largest developed residential area. Each residential sector is composed of a combination of a letter of the alphabet followed by a number, and covers an area of 2km x 2km (Figure:1.4).
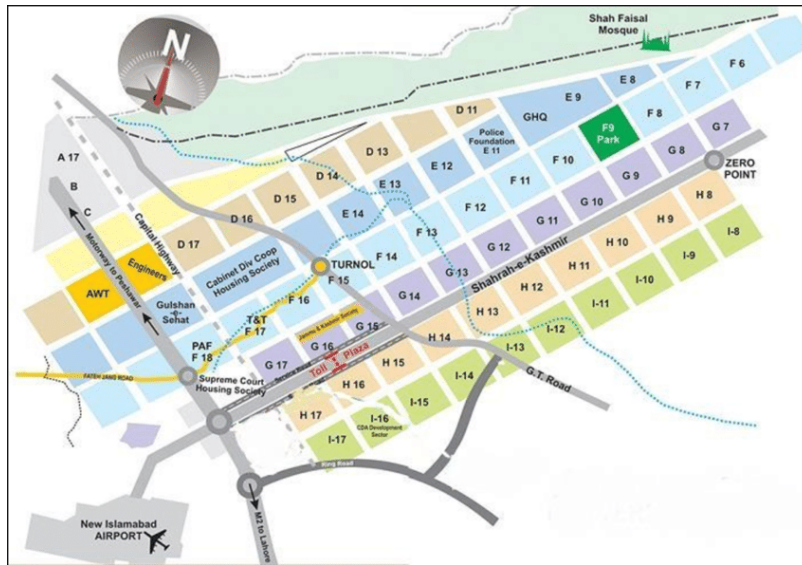
Figure 1.4. Sectors in Islamabad. Source: CDA 2014

Being born and brought up in Islamabad, the author has faced the problem of automobile dependency even in the shortest of commutes i.e. going from one sector to another, in fact this problem is faced even moving within the sector in between sub-sectors. Having shifted from Zone 1 to Zone 5 in 2018, the author started facing a huge inconvenience while travelling to and fro work to home, the former still located in Zone 1. A distance of 25km used to take up 1 hour and may even clock up to an hour and a half in extreme traffic congestion. During these one way hour long journeys, the author observed that 80% of the private vehicles stuck in congestion only had one passenger. Furthermore, a lack of alternate options was also observed.

After every few months, the local government announced an addition of lane on the Islamabad Expressway, which connects Zone 5 to the rest of Islamabad Metropolitan Area. Despite the expansion, it was observed over the years that the traffic only increased, making the congestion worse. Furthermore, it was also observed that Zone 5 and the adjoining areas are expanding at an exponential rate; what was making the residents to move from the Islamabad Centre to a fairly suburban area? All these observations lead to the exploration of automobile dependency in Islamabad and what is causing it? What are the stakeholders; who, rather than providing a layer of

public transport, keep on adding more lanes to the Islamabad Expressway? Why are residents moving from Islamabad centre to Zone 5 and other suburban areas of Islamabad? All of these questions and possible relationships are explored in this research.

While the initial masterplan of Islamabad, proposed by C.A. Doxiadis does seed the roots of automobile dependency by using the grid developed from four highways as a generator, consequent policies and stakeholders have also contributed to this phenomena. From CDA officials, to private housing society's owners and the local transport association[4], all have contributed to the current state of automobile dependency in Islamabad.

Literature on modernist cities that are automobile dependent focuses on the study of suburban areas that highlights the problem of modernist planning and the resulting urban sprawl, along with less investment in public transportation which has led to automobile dependence (Razak, 2013). The case of Islamabad is similar in this context; Zone 5; a suburb, is the most affected zone in Islamabad also facing the brunt of the missing layer of Public Transport. To achieve sustainability, while the study focuses on spatial planning strategies as BRT, TOD and congestion pricing, **the thesis aims to explore the possibilities of corridor development and transforming sprawling automobile dependent cities to smart compact transit dependent cities by utilizing their polycentric model.**

Extensive work by Peter Newman and Jeffrey Kenworthy highlights the other factors, apart from urban planning policies that lead to automobile dependence. **This is important in terms of testing the Hypothesis that Auto-mobile dependency in Islamabad is a consequence of Modernist Urban Planning. If looked under other factors, the automobile dependency may or may not be only a**

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[4] In Islamabad, the local transport association is composed of owners and managers of private Hyundai vans and local yellow taxis, which operate from "Markaz" i.e. sector centre of each sector to various routes throughout the city.

consequence of Modernist Planning and there could be other factors involved as well such as politics, stakeholders, housing authorities, public transport bodies, private transport sectors, etc.

As per the findings of Adeel Muhammad on Islamabad suburbs, the author suggests a revision in the zoning policy and management practices so as to preserve fertile rural land along with the provision of affordable and sustainable urban growth of Islamabad. **The thesis aims to study the missing layer of Public Transport and the other factors, apart from the zoning regulations, that have led to Urban Sprawl, low-density and Car-Dependency in Islamabad.**

In order to explore the issues discussed above, the research focuses one area of Islamabad, Zone 5, located at a distance of 25kms from the centre i.e. Zero Point to consolidate the research of modernist plans leading to low-density and suburban development and reach conclusions about all the hypothesis. The focus on one Zone of Islamabad helps us explore the other factors that make Islamabad automobile dependent and understands the power of stakeholders, both existing and old that keep the city residents at the mercy of automobile.

With the world moving towards a more sustainable approach in urban planning, the idea of reducing dependence on automobiles has also been brought to light in the Transport Planning Dialogue held under the United Nations Commission on Sustainable Development, where the participants observed that travel demand could be reduced by improving urban planning by integrating work, shopping and community services with residential neighborhoods (Commission on Sustainable Development, ENV/DEV/569, 2001)**.**

According to surveys conducted during the end of 20th century, low-density areas are known to produce enormous amounts of carbon emissions due to the distance travelled by residents' every day to reach their work areas. Greater the distance to travel, higher the dependence of automobile.

Furthermore, there has been an ongoing debate on how low-density sprawling development, promoted by the modernist planning, has resulted in an increased automobile dependency in these cities (Razak, 2013). Since the Master Plan of Islamabad is being reviewed, this discussion holds immense value as the Interim Report for Review of Master Plan of Islamabad (2020-2040), prepared by Federal Commission, still focuses on methods to improve transport planning that promote automobile dependency (CDA, Review of Master Plan of Islamabad (2020-2040) prepared by Federal Commission (Interim Report), 2020). Rather than moving towards "Predict" and "Prevent", the report by CDA focuses on "Predict" and "Provide" as a response to the growing needs of the citizens.

Built on the principles of modernist planning, the thesis tries to explore the characteristics that have inhibited the adaptive capacity of the city. It tries to enumerate the similarities between modernist planned cities and their commonalities which render them unsustainable. In case of Islamabad, the master plan has been held up as a rigid plan with predetermined land use, almost unchanged to date. The research tries to explore the ways through which these characteristics like the poly nuclei development in Islamabad, can serve as a potential for sustainable growth. All in all, the thesis aims to explore the following:

- Is automobile dependency a consequence of modernist planning in Islamabad?
- What are the characteristics of modernist planning that give rise to suburban development?
- Does modernist planning lead to cities with low-density?
- Is Private car ownership related to housing density issues?
- Does wealth and economic growth lead to Private car ownership?
- Who are the stakeholders that promote automobile dependency in a city?
- Are there other factors apart from land use policies that lead to automobile dependency?

- What are the different ways through which automobile dependency can be decreased in such cities?

There has been extensive research on Islamabad, mostly on its development based on modernist principles. Where transportation issues have often been brought to light; they have been mostly based on Gender based travel behaviours. The potential of Transit Oriented Development has also been discussed a lot owing to the polycentric masterplan of Islamabad. In terms of Urban Form and morphology, Ekistics have been widely studied as well. While Islamabad has been discussed extensively under the umbrella of Ekistics, modernist principles and TOD, there is a dearth of knowledge concerning its "automobile dependent nature" and the policies that promote it. This thesis aims to explore this relationship, by understanding the characteristics of modernist planned cities, the phenomena of automobile dependency and exploring the possible relationship between the two while simultaneously looking at the other stakeholders that lead to it. The research takes inspiration from Sherif Y. Razak's work on Abuja, Nigeria, where he explores how modernist planning has led to automobile dependency in the city (Razak, 2013). The work also takes up research methodology from the extensive work of Peter Newman and Jeffrey Kenworthy in *Cities and Automobile Dependence: An International Sourcebook* (Newman K. , 1989).

1.3 Research Methodolgy

Born and brought up in Islamabad, the initial propositions were based on author's own Naturalistic observation, as to what extent of traffic congestion is seen on Islamabad roads, as discussed earlier in the chapter. In order to find ground for the hypothesis, extensive literature review as well as archival research was done to understand the city and her characteristics. **Exploratory Case Study** was done to map the residential density in central core of Islamabad and the congestion points in Islamabad during peak and non-peak hours. **Retrospective Case Study** was done to

study the original and revised masterplan of Islamabad to understand what factors led to low-density and urban sprawl in the city.

In order to understand the characteristics of modernist cities, thorough literature review was done which included secondary data in the form of research papers, articles, etc. Similarly, in order to understand the phenomena of automobile dependency, indicators were marked out from existing literature and case studies. At the same time, other modernist cities having automobile dependency were compared with Islamabad to see their common characteristics and further explore the hypothesis. Modernist cities were discussed in the light of their characteristics such as zoning, the prevalence of highways, land use policies and suburban development. The study of these characteristics further helped to refine the research and test other parameters that might lead to automobile dependency in such cities. Quantitative Research helped to collect Data to understand whether Islamabad is a low-density city or not. Furthermore, Correlational Studies were used to determine the relationship between wealth, suburban development and density.

The thesis aims to understand the relationship between modernist planning principles and consequent automobile dependency. Hence, understanding the inception of Islamabad, the purpose behind her masterplan, the basic characteristics and elements of the 1960 Doxiadis plan and future aspirations as imagined at the time of its birth is of utmost importance to comprehend the reasons behind the unsustainable sprawl of the city. As discussed earlier, this has been done through collecting Secondary data, in the form of original Master Plan of Islamabad and the reports by Doxiadis from online and Capital Development Authority, (CDA) archives. Furthermore, in order to evaluate the density of the city, mapping was done both physically and with the help of Population Census data from NADRA (National Database and Registration Authority) and Pakistan Statistics Bureau. Furthermore, in order to understand the current state of automobile dependency in Islamabad, vehicle ownership data was obtained from Islamabad Traffic police and Islamabad Safe City Project. Physical mapping was also done on Islamabad Expressway during peak hours of Traffic Congestion. Borrowing the Correlational study from literature

review, relationship was mapped between wealth and low-density by retrieving data from local Property dealers in Islamabad.

The research then focuses on Zone 5 of Islamabad, the most affected area due to urban sprawl and automobile dependency in the city. Zone 5 has been explored and compared to rest of Islamabad in terms of density, vehicle ownership, land use and other demographics, the details of which have been discussed in Chapter 3, "Research Methodology". Consequently, the data set is composed of maps, demographics, relationship charts, archival records, documents and reports.

1.4   Stucture of The Thesis

The thesis is composed of six chapters, apart from the introduction, details of which are as follows:

Chapter 2 titled as "Adaptive capacity of modernist planned cities" begins with the history of modernist planned cities, discussing their inception and other factors that led to their birth. It then dwells into exploring the commonalities between these cities; including zoning and the presence of wide boulevards to name a few.

Moving forward, the chapter tries to explore the relationship between automobile dependency and modernist planned cities. Initially, the phenomena of automobile dependency is explored in the light of literature, followed by enumerating the indicators through which car dependency can be measured. Furthermore, the relationship between automobile dependency and low-density is explored in the light of scholarship. The chapter then discusses automobile dependency in modernist planned cities and explores some examples in US and Australian cities.

Chapter 3 explains the research methodology for the thesis. Beginning from the exploration of hypothesis and initial findings through personal observations, the chapter then enlists the process to test the hypothesis and answer the research question. This section also covers the scope and limitations of the research and how it might effect on the research design. Moving forward, the chapter explains the

reasons for choosing the city Islamabad and subsequently Zone 5, to test the hypothesis, how the data was collected and analyzed, and simultaneously ensuring validity of the research.

Chapter 4 titled as 'Islamabad and Automobile Dependency' explores the main focus of thesis i.e. the city of Islamabad. It beings with detailing out the history of the capital city, followed by the major characteristics i.e. the grid plan and zoning. It then takes up the issue of Urbanization of the city as well the current state of urban sprawl. In the second part, Automobile dependency is discussed while focusing on the lack of public transport systems and multi modal transport in the city.

Furthermore, a brief introduction of Zone 5 is given, which is studied at the MESO level in Chapter 5. In the last part of the chapter, the stakeholders, specifically the role of Capital Development Authority is discussed in the transportation issues of the city. Future plans of the stakeholders for Islamabad masterplan are also discussed in the light of the proposals given in the Interim Report titled "Review of Masterplan of Islamabad 2020-2040 (CDA, Review of Master Plan of Islamabad (2020-2040) prepared by Federal Commission (Interim Report), 2020).

Chapter 5, titled "A Sustainable City with Low-density" dwells upon the relationship between modernist characteristics of Islamabad that renders it unsustainable. At the Macro level, the urbanization of Islamabad over the years is analyzed through existing maps. Furthermore, the contrast in price/Sft and densities is mapped through the residential zones of Islamabad to understand the suburban sprawl.

At the Meso level, Zone 5 has been discussed extensively to understand the issue of automobile dependency in Islamabad. The data is collected through Ped Shed Analysis, other forms of mapping and site visits as well as through archival research to measure automobile dependency and understand the reasons behind it. Chapter 6, which is the last chapter, concludes the findings and suggests way through which automobile dependency can be reduced in such cities while focusing on the example of Islamabad.

CHAPTER 2

ADAPTIVE CAPACITY OF MODERNIST PLANNED CITIES

This chapter examines the concept of automobile dependency in the light of literature; both as a whole and in reference to Modernist planned cities, in order to explore the thesis title. Scholars have explored the idea of Automobile dependency in relation to the morphology of the city, the type of infrastructure that leads to it, land use, accessibility and connectivity at macro, micro and meso level, transport patterns, as well as the stakeholders which promote such conditions, which is all discussed in depth in this chapter. These concepts are then discussed under the umbrella of Modernist planned cities, with the main focus on Islamabad while comparing other such modernist planned cities having automobile dependency like in US and Australia, to understand the characteristics that lead to similarities or differences between them.

The chapter then discusses the evolution of Modernist urban planning and explores the characteristics that define a modernist city. Simultaneously, the term automobile dependency is explored in depth along with similar terms associated to it such as Car- dependent, car only and car first cities/ neighborhoods. Moving forward, the idea of sustainability, which was a pre-dominant factor in the planning of such cities is explored under the terms such as Self-sufficient neighborhoods, Ekistics, Dynapolis, etc.

After exploring the characteristics of modernist planned cities, the chapter then divulges to explore a possible relationship or parallel between the characteristics of modernist cities and automobile dependency. It investigates the initial plans and motives behind the inception of modernist cities, the way they were developed and the existing scenario by looking at examples similar to Islamabad. Hence, it opens

up a further discussion of the constant struggle between top down and bottom up approach in such cities, the stakeholders involved or the lack of potential actors, leading to a certain morphology. In the closing notes, the chapter discusses recent scholarship on sustainability and the future of automobile dependent cities through the lens of urban policy.

2.1   Inception of Modernist Planned Cities

Modernist movement came as a resolution to the economic and social crises; in the wake of the aftermath of World War. According to Remoy;

> *"Urban plans and architecture were developed according to the ideological principles of the Modernist era that were based on promoting health, social security, sufficient space, sunlight, and clean air for the city's key functions: housing, work, and recreation"* (Remoy, 2012)

Hence, city plans and architecture were developed on the basis of three key functions; housing, work and recreation. These three zones were developed in a way that promoted security and health of the masses (Remoy, 2012).

Following the 1930's Great depression and Second World War, the solution moving forward was to go towards minimalism, and adopting the idea of less is more while at the same time insuring that the health of the residents is not compromised. 20th century saw a paradigm shift in urban planning and architecture in the aftermath of industrial age; which had given birth to cities having adverse living conditions especially for the working poor. That is when theorists began to put forward ideas and interventions for healthier living conditions to not only mitigate the consequences of the era gone by [5], but also to provide better living conditions to the poor working class especially the factory workers (History of Urban Planning, 2022).

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[5] Industrial Age or Industrial Revolution

This followed by the Modern zoning legislation, a characteristic of all modernist planned cities, originated in Prussia, Germany as a result of protests by citizens on deteriorating environmental conditions as a result of uncontrolled buildup of inner city factories and housing after the Franco-Prussian war (1870-1871). Other cities in USA, Britain and Scandinavia followed course, and moved towards organized cities by zoning them according to functions for the betterment of Public health (Ben-Joseph, 2012).

From the earlier examples of Utopian cities like Contemporary City of Le Corbusier (1922), modernism promoted zoning by allocating zones for office space, transportation hubs and glorified automobile as means of transportation by segregating the pedestrian circulation from roadways (Evenson, 1969). This followed by Radiant City in 1930s, which borrowed heavily from the earlier ideas of Contemporary City apart from the stratification of housing according to size rather than the social position of the family as seen in the former[6] (Fishman, 1982). These theories later influenced the public housing in parts of Europe and United States.

The 1930s Modernist Movement, which advocated for architecture that would be a "machine for living", served as a blueprint for functionalists for the planning of cities that were highly mechanized and pragmatic, contributing to the health and better living conditions of its inhabitants. These highly rational cities were inspired by the bible of functionalists aka the "Charter of Athens"; a report on the 1933 CIAM[7] meeting held in Athens (Frampton, 1992). The report advocated for large scale redevelopment by complete demolition of historic cities and proposed a strict segregation between housing, work, and leisure. In the wake of 1930's depression and the Second World War, stakeholders including engineers, developers and politicians favored the idea of more pragmatic architecture and city planning, which consisted of zones on the basis of functionality and mass produced buildings. These

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[6] The Contemporary City
[7] Congrès Internationaux d'Architecture Moderne

zoning ideals have prevailed to date in parts of Europe, with Netherlands having the first office zones (Remoy, 2012).

Planned Cities have often come with the pre-notion that they would achieve a certain utopia; with the thought process behind them always pointing towards a better quality of life in urban systems. That is how Modernist planned cities came into existence. One can however question the adaptive capacity of such cities, and whether various factors were considered at the time of their conception or not. Throughout history, we have seen that planned cities have, if not completely, but at least in part deviated from how it was imagined to be. According to Stanley Gu,

> "*Planning and organic growth are yin and yang; both contribute to a city's well-being, supporting and energizing one another. Here, we consider organic growth to be the social and economic activities of ordinary citizens, while planning consists of activities and developments organized by local officials.*" (Gu, 2016)

This is similar to the idea of top down and bottom up approach; cities having a master plan are a top down approach, in whose conception or planning, bottom up factors are more often than not ignored, which leads to deviations. The case of Islamabad is one such example.

Lionel Frost also believes that the emergence of new urban types by the end of 19th century was triggered by the living conditions in the industrialized city. Having crowded dwelling conditions and a dearth of facilities in the industrialization age, there was a shift to zoning in modern cities in order to achieve better quality of life along with affordability (Frost, 1991).

This was aided by the fast economic growth, chiefly through trade with regional agricultural and mining products and their supply to the industrial centers, and is mainly noticeable in the western half of North America and Australia's southern coast.

2.1.1 Commonality in Modernist cities; Zoning as a characteristic

The effects of strict zoning regulations, inspired by "The Charter of Athens" and adopted by the functionalists during post World War II is still seen in cities around the world. According to Hilde Remoy, cities in Netherlands present one such example. The residential zones appear to be ghost towns during daytime whereas the office zones present a similar picture in the evening; giving rise to traffic congestion issues as a result of the commute between these areas. These regulations, which were coined for better living conditions of the inhabitants and a move towards sustainability in the 19th century, stand redundant today as the factories and industrial zones have now moved out of the city (Remoy, 2012). According to David Harvey, the conditions that had required strict zoning regulations no longer exist (Harvey, 1989). Despite this, cities and urban areas are still developed on the basis of modernist zoning regulations.

In United States, this segregation took the name of Euclidean zoning[8], which is the segregation of land uses by type into zones i.e. residential, commercial, retail, industrial, etc. Land uses will be in their own zones, so that each zone has only one landuse (What Is Euclidean Zoning?). Originally associated with the development of suburbia in the United States, Euclidean zoning has formed as a basis of planning for most cities in US since the 20th century to date.

Cities, rather than being seen as engines of growth, have often become such static due to these zoning regulations that have led to urban sprawl. Islamabad is one such example. The capital city, conceived by Doxiadis in 1959, is read through four main

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[8] Euclidean Zoning derives its name from Euclid, Ohio, whose government controls the use and development of land in almost every city of United States. This governance was established as a result of US Supreme Court decision in 1926 in Euclid vs Ambler case, which granted local governments the power to determine which properties or zones in towns are most suitable for specific uses. (What Is Euclidean Zoning?)

functions; Residence, Transport, Recreation and Work. Based on a grid-iron pattern, each block of 2000m x 2000m, is called a Sector. Each sector has five sub-sectors – four residential and one commercial called "Markaz" with auto routes running around and within its periphery (Figure:2.1). The model was inspired by American suburban model, with each sector comprising of single family homes (Hasan et al., 2021).
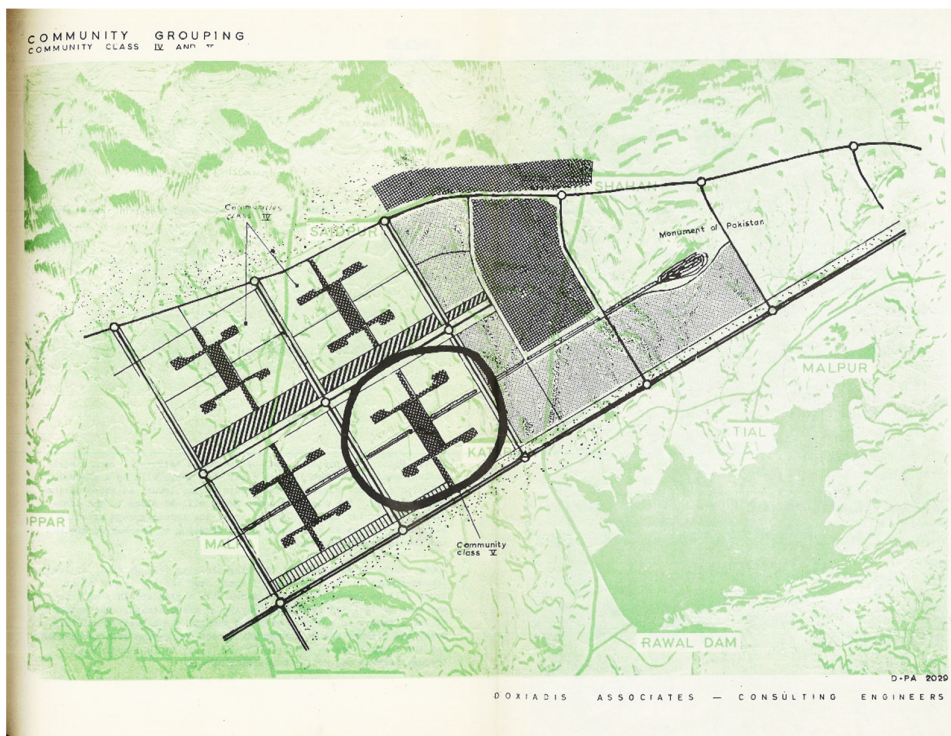
Figure 2.1. The Sector Centre of Islamabad "Markaz". Source: Islamabad Program and Plan, Vol:2, D-PA 2020

Doxiadis concept of self-sufficient neighborhoods did not work as expected, as it required the residents of each Sector to remain within their zones, with the Sector Centre i.e. Markaz catering all their needs. The plan hence lacked adaptive capacity as well and did not consider intercity migration and a population rise in the coming years (Hasan et al., 2021).

The residential sectors only accommodating single family units and the work places confined to Secretariat and Blue Area[9], eventually led to Urban sprawl; increasing travel time, pollution and destruction of agricultural land. The zoning paradigm promoted low-density residential areas and did not encourage high-rise mixed use development neither did the development of CBD favored walkability, which was aligned around highways on both sides.

Zoning regulations in the case of Islamabad were so static, that the Capital Development Authority (CDA), failed to take measures to accommodate the inter-city migration and population increase over the years leading to suburban sprawl with an estimated three times expansion in the past three decades as seen in the urban contiguous areas (Liu, 2020).

2.1.2 The Predict and Provide Approach; understanding the idea of wide Boulevards, Highways and Free-ways

Boulevard:

A boulevard is defined as multi lane road, which has trees and vegetation on both sides of it, having a median in the middle. In America, boulevards are high speed thoroughfares, which are multi lane often divided with a central median, with the adjoining streets acting as service lanes, having low speed limits. In Northern America, the name could be interchangeably used for an urban highway as well (Wikipedia contributors, 2023).

From the earliest boulevards in ancient Middle East to Europe and then finding ground in United States in mid-19th century, boulevard design evolved to prioritize smooth flow of vehicular traffic with its wide lanes. This overlapped with the

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[9] Central Business District- CBD

American preoccupation with destination and speed, making it a widely used modern street type (Jacobs et al., 2003; Britannica, 2009). Boulevard took its name from the Dutch word, "Bolwerk", meaning flat surface of a rampart, which represents the replacement of city fortification by a wide tree lined promenade, as seen in France in 1675. The term was then applied to other avenues as well, that were created by demolishing buildings on either of its sides (A Stroll Down the History of 'Boulevard', 2023). Boulevard is commonly a major axis in the city, usually leading to an important monument or significant area as seen in Paris and Washington, D.C. (Britannica, 2009).

In Islamabad, the word boulevard is interchangeably used with the term avenue, which is also defined as a public way having buildings or trees on either side of it; running perpendicular to streets. Similar to boulevards in US, Avenues in Islamabad provide an orientation to significant monuments like Jinnah Avenue leading to Pakistan Secretariat and Faisal Avenue leading to the National Mosque i.e. Faisal Mosque.

However, an avenue may or may not have a median. By definition, the speed limits in an Avenue are faster than boulevard due to the presence of roadways on each side. However, in both avenues and boulevards, priority is given to vehicular traffic while pedestrians either walk along the avenue or use peripheral roads in case of boulevards (Njogu, 2019).

Highway:

Highway is defined as a major and wider public road for vehicular travel accommodating higher volume of traffic with greater speeds. However, highways may have crossing, intersections, signals and even footpath on one or both sides (Auto News Eye, 2023). Unlike Boulevards, Highways may or may not have median as a divider between traffic moving in opposite directions. Highways usually have multiple lanes for traffic but can also be two-lane roads with wide shoulders (Jerly, 2023).

Highways do not have a controlled access and can be accessed by pedestrians, bicycles as well as Non-Motorized Transport. Since this type of road network does not have a controlled access, hence there are no interchanges in order to enter a highway and it can be entered at any local crossing. Due to the presence of signals and pedestrian crossings on highways, the speed limits on highways are lower than Freeways, which is another type of highway explained later in the section.

In United States, freeways have commonly a speed limit of 112 to 128km per hour. However, this speed limit decreases to 88 to 112 km per hour in a highway (Auto News Eye, 2023). In Islamabad as well, the speed limit on Srinagar Highway is 80km/h whereas on Islamabad Expressway, it increases to 120km/h.

Freeway:

A Freeway is a type of highway that has two or more lanes on each side, designed for high-speed vehicular traffic, with regulated traffic flow. According to The Manual on Uniform Traffic Control Devices, freeways are defined as control-access highways (Jerly, 2023). Interchangeably, freeway can also refer to motorway[10] and expressway[11] in some places. Where expressway efficiently provides connections within the city, motorways connect different cities with each other. Due to the high speed traffic, Freeway strictly implies that walking and parking is strictly prohibited (Wikipedia Contributors, 2023).

In order to provide un-interrupted flow of traffic, overpasses, underpasses and pedestrian bridges are provided in a Freeway instead of traffic signals and intersections. Similarly, entrances and exits to freeways are provided in the form of interchanges, which allow speed changes between highways and arterial roads. Similar to boulevard, freeways are divided by a median strip to develop a barrier

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[10] Used in United Kingdom, Pakistan, Ireland and parts of Australia
[11] Used in parts of United States and Canada, Australia, India, Japan, Pakistan, Philippines, South Korea, etc.

between opposing direction of traffic and provide safety (European Transport Safety Council, 2008).

Freeways first evolved during the first half of 20th century, with the expansion in car industry overlapped with Modernist movement. These controlled access highways evolved as a connection between cities in the first half of 20th century connecting cities, with Italy opening its first autostrada A8 in 1924 and Germany building its first autobahn in 1932 between Cologne and Bonn. The system was then replicated in entire Europe. By 1920s, these freeways were built in America, with New York City having controlled access highway within city (Wikipedia Contributors, 2023).

Similarly, Islamabad followed the same pattern, with the first axis of Masterplan Grid defined by Islamabad Highway and Capital Highway running perpendicular to Margalla Highway, Murree Highway and Soan Highway. In Islamabad, Expressway plays the role of a Freeway, having high traffic volume and fast speed with no crossing at grade. While Islamabad Highway has taken the name of Islamabad Expressway, having six to ten lanes, Murree Highway has developed into Srinagar Highway with lanes varying from three to five. Both of these highways have controlled access, with entrances and exits in the form of interchanges, and connection to adjacent roads through underpasses and overpasses.
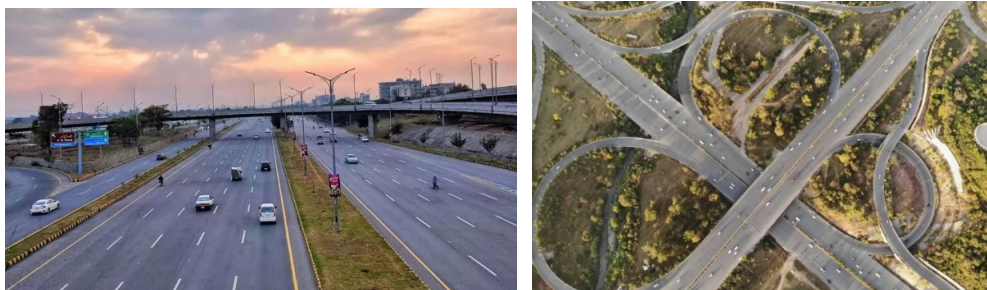
Figure 2.2. Left: Four Lane Srinagar Highway in Islamaabd. Right: Intersections on Srinagar Highway. Source: (Siddiqui, 2022)

Table 2.1 Table shows differences between Boulevard, Highway and Freeway.
Source: Author (Data collected from works cited in Section 2.1.2)

Description	Boulevard	Highway	Freeway
Lanes	Minimum 3 Lanes	Minimum 2 Lanes	Minimum 3 Lanes
Speed Limit	70km/h to 80km/h	70km/h to 100km/h	110km/h to 120km/h
At-Grade Crossings	Yes	Yes	No
Intersections or Traffic signals	Yes	Yes	No
Ingress and Egress	Local Crossing and Intersections	Local Crossing and Intersections	Entrance and Exit Ramps
Median	Yes	Not necessary	Yes

The Concept of Boulevards, Highways and Free-ways in Modernist Plans:

From the early examples of modernist urban planning in 1800s, wide boulevards were a characteristic feature, as seen in the remodeling of medieval streets in Paris by Georges-Eugene Haussman (History of Urban Planning, 2022).

By introducing highways and free-ways, modernist planning has somehow promoted the idea of suburbs. According to Andrew Price, people would prefer to build on land that is cheaper i.e. the suburb and accessible; thanks to the highways, rather than in the middle of the city; which is more expensive. This in turn increases the value of the previously inaccessible countryside that can now be easily accessed.

> "*The law of supply and demand dictates that if you increase supply without any significant change in demand (such as a larger population), the price will fall.*" (Price, 2020).

When cities become automobile dependent or favor automobile usage, the use and ownership of automobile doubles in those areas leading to an increase in Road lanes and networks, eventually increasing the cost of infrastructure, parking, energy, etc. (Kiprop, 2019).

According to Newman and Kenworthy (1999), automobile dependent cities tend to move in a never ending cycle of predict and provide (Figure:2.3);

> *"Road and parking requirements became a bottomless pit that seemed to absorb any traffic solution and replace it with a new set of congestion constraints. The reality is that individual desires for mobility in a city where individualized locations are not subject to constraint will inevitably mean that traffic rises at super exponential rates. [...] Most larger cities that have gone the way of the automobile [...] cannot function well when their land use pattern assumes all parts of the city are to be easily reached from everywhere else, and the city spreads beyond forty to fifty kilometers"* (Newman & Kenworthy, Sustainability and Cities: overcoming automobile dependence, 1999, p. 59).
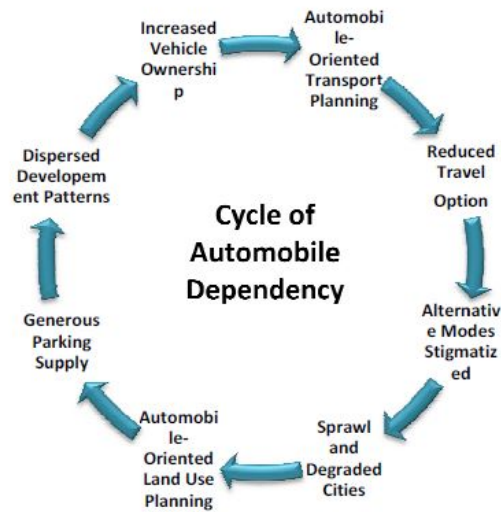
Figure 2.3. Cycles of Automobile Dependent city. Source: Victoria Transport Policy Institute. (VTPI, Automobile Dependency, 2019)

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Islamabad was also developed as a small, low-density city. The functionality fell when the city expanded beyond the original anticipated numbers and the land use zones became difficult to access from all parts of the city. Currently, the vehicle ownership in Islamabad stands at 0.7 million[12] according to Islamabad Traffic Police data.

According to Newman and Kenworthy, in automobile dependent cities, when areas are inaccessible for those who are not able or willing to drive, access is provided through road based transport or modifications in infrastructure is done, which again is a predict and provide approach and leads to more road based additions. On the contrary, a sustainable approach would be to provide areas to the population in close vicinity (Newman & Kenworthy, Sustainability and Cities: overcoming automobile dependence, 1999). This again, overlaps with the concept of Modernist zoning, which segregates areas on the basis of land use.

Automobile dependency leads to wider roads and increased traffic, which in turn creates inequality for Non-Motorized Transport and pedestrians (Jim Conley, 2009). Conventional transport planning practices also support this cycle of Predict and Provide; a hypothesis where past traffic numbers are used to predict future travel demand; which results in adding more road infrastructure that supports automobile transport. This prediction then directs all the public funding and existing land, which could have been used for Non-Motorized transport or other purposes, towards more roads or additional lanes for automobile traffic (Gössling, 2015).

In order to accommodate the predicted traffic levels, negative impacts that arise from such investments like more dispersed destinations, wider asphalt surfaces, inaccessibility for other forms of transport or pedestrians are completely ignored.

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[12] (Chaudry, 2016)

The result of this predict and provide approach is then a more automobile oriented transportation network and a land use pattern that supports this, like zoning and suburban development (VTPI, Automobile Dependency, 2019).

2.2 Automobile Dependency in Modernist Planned Cities

Segregating work, living and leisure, which was once a solution to deteriorating living conditions in the industrial era, is no longer functional owing to different working conditions today. In his book "The Rise of the Creative Class" Richard Florida explains how todays' working class differs from "white collar" workers of the industrial age, who do not require a segregation between their working environment and their place of residence (Remoy, 2012). According to David Harvey, a spatial shift is the inherent resolution of major crises that the world is facing today (Harvey, 1989).

Cities in Australia and United States like Melbourne, New York, Los Angeles and Peterborough, which gave a preference to highway development, have increasingly become vehicle dependent. In United States alone, 76% of all the commute is done via automobile (Kiprop, 2019). In contrast, cities in Europe like Paris and in other continents such as Tokyo and London are among least dependent because of the preference to multi-modal transport (Kiprop, 2019). In a similar study, Peter Newman and Jeffrey Kenworthy noted that the residents of American cities consumed nearly four times as much as the more compact European cities and ten times that of three compact westernized Asian cities, Hong Kong, Singapore and Tokyo (Cities and Automobile Dependence: An International Sourcebook, 1989). Cities in Asia and South America like São Paulo, Shanghai, Beijing, Mumbai, Taipei, and Guangzhou and a few in Europe like Prague are increasingly moving towards automobile dependency due to a number of reasons including population influx, better income and an improved road network and infrastructure (Kiprop, 2019).

Sprawled development, which is one of the stimulants of automobile dependency is also induced by modernist urban planning, through its zoning and land use. By having a land use that is sprawled, accessibility is reduced and more mobility is required (Jim Conley, 2009).

Studies suggest that the advent of modernism overlaps increased automobile travel. Where this may be due to the increase of automobile production, availability and usage due to other factors, but it is hard to exclude the land use policies that have induced high level automobile dependency in most areas (Turcotte, 2008).

Modernist movement brought with a promise of better living conditions. This translated to encouragement of the use of automobile; with the ownership of a private vehicle being considered as a reflection of wealth and increased use of automobile being a reflection of Economic Development. This school of thought prevails today as well with many public officials in transportation planning inclined towards automobile dependency and focusing on the problems faced by them and neglecting the other users (Institute, 2019).

2.2.1   Defining Automobile Dependency

The term automobile dependency has been defined and discussed extensively in literature owing to its significance on urban planning, transport issues and sustainability to name a few. In simple terminology as the name suggests, automobile dependency is the over-reliance on automobile oriented transport which may include cars, vans, light trucks, SUVs, etc. (Kiprop, 2019; Litman T. , 2002)

Automobile dependency is observed when there is a high level of per capita automobile use and the land use pattern favors automobile along with fewer options of transportation alternatives (Litman T. , The Costs of Automobile Dependency and the Benefits of Balanced Transportation, 2002). Research suggests that high automobile dependence is observed when commute for basic facilities such as work,

leisure, education by using automobile exceeds 75% of all personal trips (Kiprop, 2019).

Newman and Kenworthy have extensively analyzed automobile dependency, land use patterns and sustainability in their work. The term "automobile dependence" was used by them to describe the outcome of urban transport and land use policies that presuppose the proliferation and dominant use of the car in urban transport as a given, constructing settlement patterns and transport infrastructures which leave very little room for alternative modes (Newman, 1989; Scheurer, 2001).

According to WorldAtlas, there may be a number of reasons for a city to be automobile dependent which may include lack of infrastructure, lack of alternative transport modes, user preferences to name a few (Kiprop, 2019). Automobile dependency is a resultant of various parameters; which include both land use and transport factors among others. Literature has debunked the myth that only one of these factors could be solely responsible for automobile dependency in a city; in reality, it is the combination of several factors that render a city automobile dependent (Newman & Kenworthy, The Ten Myths of Automobile Dependence, 2000; Litman T. , The Costs of Automobile Dependency and the Benefits of Balanced Transportation, 2002) (See Table:2.2). In contrast, Litman uses the term "Balanced Transportation", which is explained as consumers having numerous transport options with the choice to use each mode for what it does best (Litman T. , Evaluating Transportation Choice, 2001).

Table 2.2 Table shows a comparison between parameters that define automobile dependency and balanced transportation. Source: (Litman T. , The Costs of Automobile Dependency and the Benefits of Balanced Transportation, 2002)

Factor	Automobile Dependency	Balanced Transportation
Motor vehicle ownership	High per capita motor vehicle ownership.	Medium per capita motor vehicle ownership.
Vehicle use	High per capita motor vehicle use.	Medium per capita motor vehicle use.
Land use density	Low.	Medium.
Land use mix	Single-use development patterns.	Mixed-use development patterns.
Land for transport	Large amount for roads and parking.	Medium amount devoted to roads and parking.
Road design	Road designs favoring automobile traffic.	Road designs balancing modes.
Street scale	Large scale streets and blocks.	Small to medium streets and blocks.
Traffic speeds	Maximum traffic speeds.	Lower traffic speeds.
Walking	Mainly in private malls.	On public streets.
Signage	Large scale, for high speed traffic.	Medium scale, for lower-speed traffic.
Parking	Generous, free, rigid requirements.	Modest, some priced, flexible requirements.
Site design	Parking paramount, in front of buildings.	Parking sometimes behind buildings.

Among the factors listed above, a number of those form major characteristic of a modernist plan. As discussed earlier in the chapter, literature shows that Low-density development, Single use development; also known as zoning, boulevards and large scale streets and blocks all form a part of most modernist plans. This table, backed by literature, supports the relationship between automobile dependency and a few characteristics of a modernist plan.

Some historians term automobile dependence as a process which is continuous and evolves with the urban form; which is developed through transport, economic and cultural factors (Parapari, 2010). Earlier, due to the lack of advancement in transport technologies, cities were built on walkable distances till the 19th century (Figure:2.4), where there was a shift to automobile owing to the industrial revolution. The same phenomena has been translated today as walkable neighborhoods, having essential amenities within 400m radius i.e. 5 minute walk, in the wake of sustainability issues globally.
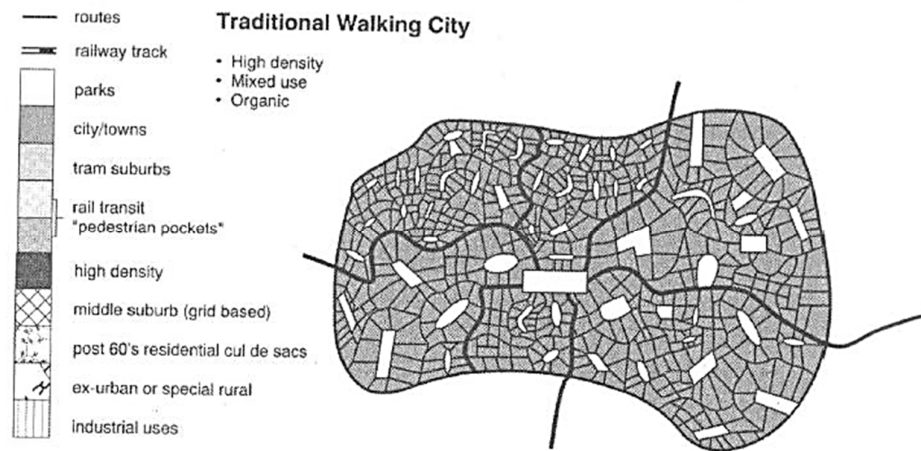
Figure 2.4. The Walking City. Source: Newman, P., & Kenworthy, J. R. (1999). Sustainability and Cities: overcoming automobile dependence. Washington DC: Island Press.

While the emergence of rail transit systems in the later part of 19th century enabled the cities to expand beyond the compact centres and aided in the development of suburbs along the rail corridors (Figure:2.5); it was the introduction of car that triggered the development of settlements with low-density and far-fetched suburbs which were inaccessible or hard to access earlier (Figure:2.6) (Parapari, 2010).
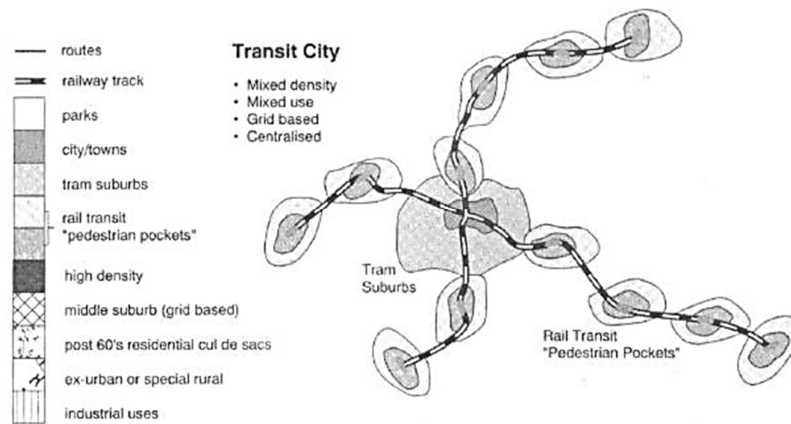
Figure 2.5. The Transit City. Source: Newman, P., & Kenworthy, J. R. (1999). Sustainability and Cities: overcoming automobile dependence. Washington DC: Island Press.
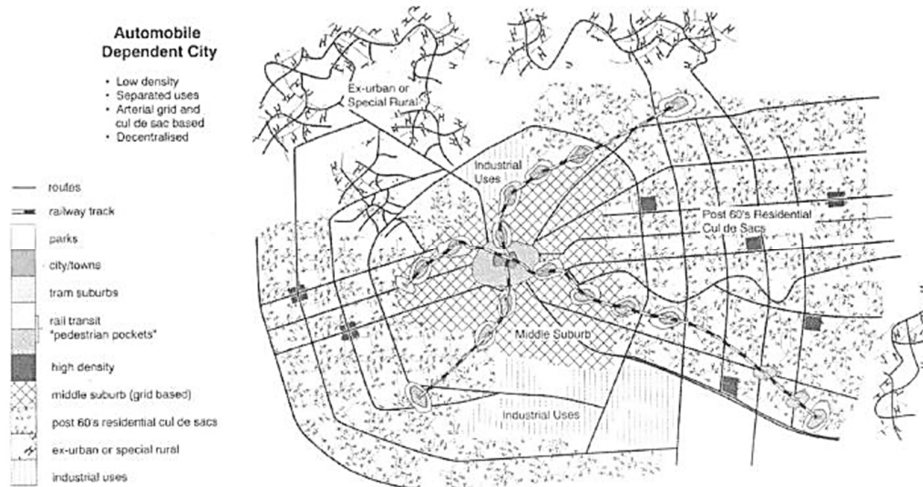
Figure 2.6. Automobile Dependent City. Source: Newman, P., & Kenworthy, J. R. (1999). Sustainability and Cities: overcoming automobile dependence. Washington DC: Island Press.

Automobile Dependency not only increases vehicle ownership, fuel cost and demand for road infrastructure, but also imposes economic and social downturn by increasing health risks, environmental damages and inequity for Non drivers and Non-Motorized forms of transport (Jim Conley, 2009).

2.2.2　　Measuring Automobile Dependency

As discussed earlier in the chapter, Automobile Dependency can come in different ranges; there are areas that might seem completely automobile dependent but in reality, they do have other modes of Non-motorized transport as well, although pretty minimal and inefficient hence the preference to Automobile. Similarly, the term Car-free might indicate that the area in which such policy is applied completely prohibits car use but in reality it does have some sort of car usage for emergency purposes, taxis, deliveries, etc. to name a few (Automobile Dependency, 2019).

> *"There is no single cause of Automobile Dependency – various mutually supporting factors both contribute to and result from automobile dependency creating a self-reinforcing cycle of increased automobile ownership and use, more automobile dependent transport and land use patterns, reduced transport options, and further increases in automobile ownership and use"* (Turcotte, 2008)

There are numerous indicators in which automobile dependency can be measured like automobile usages, vehicle ownership, land use accessibility, quality of other modes of transport and personal preferences of users (See Table:2.3). Studies suggest that if private automobile usages exceeds 80% of personal trips, then the area can be categorized as highly automobile dependent. Similarly, while greater vehicle ownership might indicate automobile dependency, it might be due to user preference and not because of a dearth of other transportation options (Automobile Dependency, 2019; Parapari, 2010).

Table 2.3 Attributes of Automobile Dependency Source: TDM Encyclopedia (VTPI, Automobile Dependency, 2019)

Indicator	Description	Low	Medium	High
Popular Name		Carfree	Multi-modal	Automobile Dependent
Vehicle Ownership	Per capita motor vehicle ownership (usually measured per 1,000 population)	Less than 250 per 1,000 pop.	250-450	450+
Vehicle Travel	Per capita annual motor vehicle mileage	Less than 4,000 miles (6,500 km)	4,000-8,000 miles (6,500-13,000 kms)	8,000+ (13,000 km plus)
Vehicle Trips	Automobile trips as a portion of total personal trips	Less than 50%	50-80%	80%+
Quality of Transportation Alternatives	Convenience, speed, comfort, affordability and prestige of walking, cycling and public transit relative to driving.	Alternative modes are of competitive quality.	Alternative modes are somewhat inferior.	Alternative modes are very inferior.
Relative Mobility Of Non-Drivers	Mobility of personal travel by non-drivers compared with drivers.	Non-drivers are not severely disadvantaged.	Non-drivers are moderately disadvantaged.	Non-drivers are severely disadvantaged.
Land use patterns	Land use density (residents and jobs per acre) and mix (proximity of different land use types).	Very compact and mixed.	Moderately compact and mixed	Dispersed and homogenous
Transport system	Type of transportation facilities and services available.	Mainly nonmotorized and public transit	Very mixed: nonmotorized, public transit and automobile.	Mainly automobile (roads and parking facilities).
Roadway design	Design features of public roads.	Highly pedestrian oriented	Mixed.	Designed to maximize auto traffic speeds and volumes.
Shopping Options	Where retail and other public services are located	Along public streets	Mainly along public streets near transit areas	In private malls, located along major highways
Market Distortions Favoring Automobile Use	Relative advantage provided to automobile transportation over other modes in planning, funding, tax policy, etc.	Minimal bias favoring automobile travel.	Moderate bias favoring automobile travel.	Significant bias favoring automobile travel.
Automobile commute mode split	How people travel to work and school.	Less than 35%	35-65%	More than 65%
Errand travel	How people normally travel to stores, professional appointments, recreation activities, etc.	Mostly walking, cycling and public transit.	Walking, cycling, public transit and automobile.	Mostly automobile.
Performance Indicators	How transport system performance is evaluated	Quality of walking, cycling and public transit	Multi-modal	Automobile-oriented

Modernist cities in North America tend to be more automobile dependent because of two reasons; the major one being the land use. Land use patterns in these cities are such that they are easily accessible by automobile as opposed to other modes of transport. This in turn leads to the second reason; car ownership and car usage is also greater in these cities. This shows that land use coupled with public policies that favor car usage tend to increase car ownership and usage i.e. more than 80% of personal trips by citizens are done by private vehicle (Newman, 1989; Parapari, 2010; Automobile Dependency, 2019).

Since modernist cities through zoning and development of suburbs promoted free-ways and highways; they also built a theory that increased car ownership reflects wealth and higher income. This hypothesis has been tested in several studies and has been debunked. Focusing on data from US, Holtzclaw found a curve between rising income and car ownership which peaks at $30,000 annual income and then flattens but then starts to decrease at incomes over $100,000 (John Holtzclaw, 2002). Other studies also debunk the theory that greater wealth leads to increased car ownership. This might be due to wealthy owners having alternate option or living in more accessible neighborhoods, such as the downtowns which are high in density (Gakenheimer, 1999).

In areas which are automobile dependent, the speed limits are generally on the higher side. This shows that the pedestrians and other forms of Non-motorized transport are given less priority. Not only are these areas affected by noise, accidents and functional segregation to prioritize car but are also visually segregated (Newman & Kenworthy, Sustainability and Cities: overcoming automobile dependence, 1999). Islamabad with its 7th and 9th Avenue running through and through present an example of visual and functional segregation.

Similarly, in car dependent cities, public spaces are often privatized which reduces both the safety and their purpose; i.e. casual interaction between citizens (Parapari, 2010). In areas where these problems are identified, they are overcome by providing

security or preference to special user groups (Scheurer, 2001). This however prioritizes vehicles over human interaction and promotes social segregation; which goes against the notion of community building through passive surveillance[13] (Newman & Kenworthy, Sustainability and Cities: overcoming automobile dependence, 1999).

Another tendency of automobile dependent cities is that their per capita traffic deaths are higher as compared to high density compact cities (Figure 2.7). This could be explained due to the presence of freeways having speed limit of 120km/h even within the city. Where road improvements reduce per-mile car crashes, total crashes are on the higher side due to higher speeds (Parapari, 2010) .
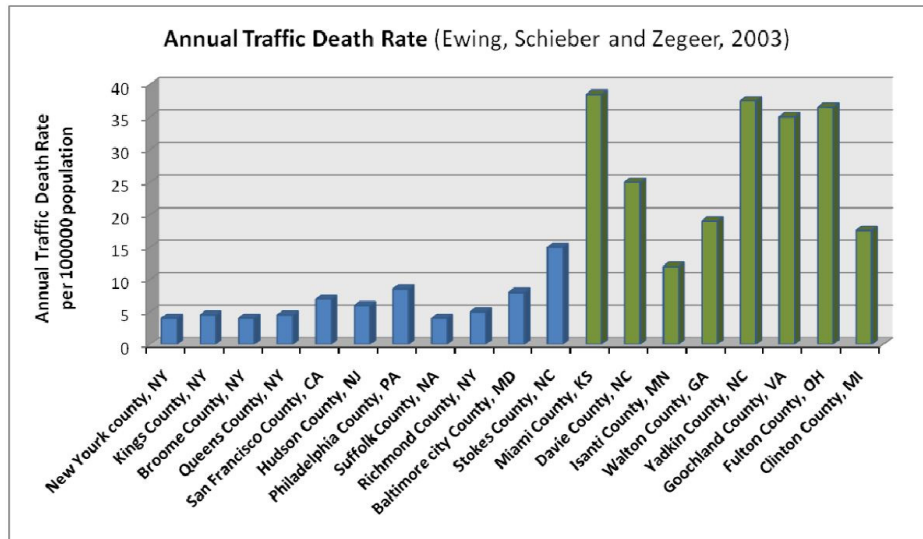
Figure 2.7. Figure shows that per capita traffic deaths are higher in sprawled communities. Source: (Parapari, 2010, p. 20)

Investment practices, both at local and government level also contribute to Automobile Dependency. A major indicator of a city being automobile dependent

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[13] Jane Jacobs theory of Eyes on the street

would be when majority of the transportation funding would be dedicated to roads and parking and less to transit or walking facilities. Similarly, zoning codes of an automobile dependent city would tend to include minimum parking requirements of a commercial or public development area. Similarly, by increasing the land requirements in zoning codes and segregating land use, zoning policies can lead to low-density development along with suburban sprawl and urban fringe development (VTPI, Automobile Dependency, 2019).

Another viable indicator of automobile dependency is automobile ownership; in areas that are car dependent, private car ownership typically doubles along with the cost including ownership cost, fuel expenses (that form a part of household budget), road and parking infrastructure costs, accidents, energy consumption, AQI[14] as well as land use for road network.

For instance, a comparison between US cities which are transit oriented and multi-modal like Davis and California with the ones having sprawled neighborhoods like Houston and Texas shows that in the former, residents average 13.9 daily vehicle miles whereas in the latter residents average 34.0 daily vehicle miles. In a similar way, travel patterns can be compared with wealthy countries; since according to some advocates of automobile dependency, car ownership equates to economic development (Holtzclaw et al., 2002). A comparison between US cities with those of other wealthy countries, like Norway and Switzerland debunks this theory. Where US residents devote approximately 20% of household incomes to transportation (motor vehicles, public transit and residential parking), Swiss residents spending, amounts to half of this figure approximately. While automobile might be considered a faster way to reach destinations, studies show that there is no measurable difference between the amounts of time people spend while commuting in a multi modal

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[14] Air Quality Index

location as compared to automobile dependent one. Despite automobile being faster, the reason why the users take almost the same time to reach their destinations is that automobile dependent areas are farfetched, and dispersed, hence the travelled miles increase which do not save any additional time (VTPI, Automobile Dependency, 2019).

Other studies have also shown the weak link between greater wealth and automobile usage. For instance, US residents drive twice as many annual miles as German residents living in areas of similar densities and having similar income only due to two reasons; the fuel prices are lower and lesser transportation mode options. As with modernism, dispersed land use patterns and a reduction in other transport options increase automobile dependency consequently increasing per capita vehicle travel and a complete reduction of alternative modes (VTPI, Automobile Dependency, 2019).

A comparison between automobile dependent cities and transit oriented and car free communities shows that in the former setup, households use automobile for most trips. In Transit oriented areas, users have an option of mix modes, whereas in the car free zones, NMT is usually the most used mode along with public transport. Automobile In such communities is only limited for delivery, service and emergency services (VTPI, Automobile Dependency, 2019).

2.2.3 Automobile Dependency and Low-density?

An analysis by John Holtzclaw suggests that driving is reduced 30 percent every time density doubles and that even sprawling suburban areas would benefit from only a modest increase in density (Holtzclaw et al., 2002). Several urban researchers have discussed how car dependency, both in terms of use and ownership, is reduced in higher density areas at all levels of wealth (Newman K. , 1989).

An extensive study by Newman and Kenworthy (1989) highlights the significant difference in density and car use patterns between U.S/ Australian and European/ Asian cities; despite the incomes being higher in European cities. Their research shows that European cities are 4 times denser than their counterparts in US and Australia and two to three times less dependent on car use despite having their per capita income 20% to 50% higher than that in Australian and US cities. The study highlights that higher activity densities such as in Europe and Asia had a greater significance of public transit and NMT with a lower travel demand overall whereas the lower densities as seen in cities of 20th century, mostly in Australia and US are automobile dependent with a higher travel demand (Newman K. , 1989).

This study by Newman and Kenworthy analyzes the transport patterns and land use in major cities around the world to understand the factors behind automobile dependency. Furthermore, it highlights the importance of stakeholders; who determine the land use in a city along with the transport policies and infrastructure, which reduces automobile dependency.

There is a general notion regarding freeways or highways that high speed reduces travel time however in reality they promote longer trips in terms of kilometers travelled (Parapari, 2010). According to literature, cities throughout history have adapted a size that produces an average daily commute of 30minutes one way (Ryan, 1980; Knoflacher, 1994). Modern cities have translated this commute to the provision of freeways from one point to another, increasing the distances while anticipating that the vehicular speed will reduce the travel time.

2.2.4   Understanding the stakeholders

According to literature, automobile dependency is favored by public and planning policies because when communities become dependent on automobile, the population that seeks alternative modes of travel begins to shrink. This brings in more profits to the private stakeholders, who then have to spend less on public

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transport infrastructure. Not only this, the preference of automobile over public transport or NMT is a reflection of wealth, hence it brings about increased consumer preference. Over the years, this model has been celebrated as convenient, bringing in comfort along with economic growth which was imagined to be a reflection of modernist movement (Kiprop, 2019).

However, Newman and Kenworthy (2000) argue that some of the most common reasons of automobile dependence like wealth, climatic conditions, space, age of the city, health and social problems, rural lifestyles, road lobby, land developers, traffic engineering and even town planning to some extent are not sufficient in themselves hence should be labeled as "Myths about Automobile dependence", which are propagated to form the narrative that there is nothing policy makers, practitioners and activists can do to revert automobile dependence (Newman & Kenworthy, The Ten Myths of Automobile Dependence, 2000).

Suburban development has been favoured by economic forces, primarily because of the land value; land cost is fairly high in compact centres and cities as compared to the fringe where land is cheaper. This makes suburban development attractive for land developers particularly for uses such as residential development like villas or industrial development (Parapari, 2010). The same can be seen in Zone 5 of Islamabad, Pakistan. Located at a distance of 25kms from the centre of the city i.e. Zero Point, Zone 5 currently houses 29 illegal private housing societies[15], all owned by private land developers (Societies, 2021). The shift has been favoured by both the developers and the residents owing to the price difference; where 1 marla[16] costs around PKR 3 million in the centre, the same is for PKR 0.9 million on average in Zone 5 (Zameen.com, 2022). The same is witnessed in the agricultural area of the capital, Chak Shahzad, earlier reserved for farm houses and agricultural land use

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[15] Illegal Housing societies do not have a building permit and NOC from CDA.
[16] Marla is a unit of area used in Indian subcontinent. In Islamabad, 1 Marla equals to 225 Sft/ 20.9 Sqm/ 25 Sqyd

currently houses 83 illegal residential societies. Despite being labelled as illegal by CDA[17], the development authority of Islamabad; the buyers have not hesitated from purchasing land there or constructing houses owing to the 3 times lesser price of land as compared to the centre on average.

A similar shift was seen when the modernist city found its ground in the 20th century. Owing to the decline of living standards in the industrialist city, the idea of extensive home ownership and the rural lifestyles of the past led to the emergence of suburbs in the cities (Scheurer, 2001).

At the turn of the 20th century, it was assumed that urban freeways and suburbs development will bring about better lifestyle and a representation of economic wealth. According to Newman and Kenworthy (1999), this notion had been backed by the stakeholders and decision makers of the cities as well:

> *"There has always been awareness that urban freeways, do environmental and social damage [...]. But this impact has been acceptably traded off by decision makers, who saw economic gains from the extra mobility.[...] Yet it appears that in most nations the acceptance of the myth of economic progress based on the Auto City has not come about from analysis or evaluation but merely from assertions, often dressed up in scientific form in the guise of a model"* (Newman & Kenworthy, Sustainability and Cities: overcoming automobile dependence, 1999, pp. 52-53)

Studies show that automobile dependency is a cycle; as a community becomes increasingly automobile dependent, the users who rely on other transportation modes decrease, hence making the stakeholders further affirmative on their idea that increased road infrastructure is the only solution and need. This leads to public policies and decisions which give preference to automobile over other modes of transport. Another brainchild of this particular school of thought makes automobile

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[17] Agro Farming and Residential Housing Schemes are permissible in Zone-4 under the provisions of ICT (Zoning) Regulation, 1992 [amended in 2010] and permissions are granted by CDA after completing the codal formalities. (Societies, 2021)

dependency even desirable; greater vehicle ownership means more wealth and that it is a synonym of convenience and economic development (VTPI, Automobile Dependency, 2019). This assumption has been debunked through various studies. Beyond an optimal level, vehicular traffic provide little benefits as compared to the increasing costs and becomes economically and socially unviable (Litman T. , 2002; VTPI, Automobile Dependency, 2019).

It is interesting to note that automobile dependency advocates quote that 70 to 90% of trips are made by automobiles (depending on conditions) (VTPI, Automobile Dependency, 2019). But, it is not considered that how many alternatives do these users have which are accessible, economical and promote equity. Literature has proven that these numbers drastically reduce in areas which have better transport alternatives. In a study, Guo and Gandavarapu (2010) estimate that on average non-motorized travel increases 16% (from 0.6 to 0.7 miles per day) and automobile travel reduces 5% (from 22.0 to 20.9 vehicle-miles) by completing the sidewalk network in a typical U.S. town. In a similar way, residents of transit-oriented communities drive 10-30% fewer miles than those of automobile dependent cities along with using alternative modes 2-10 times more frequently than the latter (Arrington, 2008; Litman T. A., 2009).

Among the stakeholders, policies serve a major part in promoting automobile dependency. Underpricing, limited alternative choices, weak competition, bias towards automobile in planning and investment, all form a part to promote automobile usage.

Along with policies that favor automobile dependency, there are transportation evaluation practices that also focus mainly on vehicle traffic, for instance, such practices would evaluate roadway service, average speed and congestion delays and provide solution that would favor automobile dependency while giving little importance to other modes. NMT, on the other hand, is mostly measured in the form

of surveys and only limited to their role as leisure trips, walking links to automobile aka the last mile, or in the form of short trips (VTPI, Automobile Dependency, 2019).

2.3   Concluding Remarks

One of the defining characteristics of modernist planned cities is zoning according to Land Use which was inspired by "The Charter of Athens" and adopted by the functionalists during post World War II. The regulation segregates different types of land use into separate zones so that there is no overlapping of functions. For instance, residential, commercial, retail, industrial, etc. land uses are placed in their own separate zones, so that each zone has only one land use. This in turn makes the cities static leading to urban sprawl.

Another defining characteristic of Modernist cities is wide boulevards and highways. Developed during the industrial revolution, where car was representation of wealth, cities were designed in a way so as to give preference to cars over pedestrians. This led to high speed highways and freeways, making the use of car dominant over Non-Motorized forms of transport. It was perceived that far-fetched zones can be easily accessed through cars due to the signal free nature of highway; greater distance can be covered in shorter time as opposed to the time taken by any form of public transport.

By introducing highways and free-ways, modernist planning somehow promoted the idea of suburbs. Through this initiative, the much cheaper land in suburb became accessible as well, hence people started to prefer building in the suburbs rather than in the centre, which was far more expensive. Hence, the Land use zoning regulations, along with the provision of highways, low-density and suburban sprawl can be seen in a loop, where each regulation promoted the introduction of the other. Similarly, when car becomes the dominant form of transport, congestion is observed on these high speed highways, which increases the commute time. In order to overturn this,

Modernist cities use the "Predict and Provide" approach rather than "Predict and Prevent" which eventually leads to Induced traffic.

The second part of literature review explores the term Automobile Dependency which is defined as the over-reliance on automobile oriented transport which may include cars, vans, light trucks, SUVs, etc. Scholarship suggests a number of indicators through which automobile dependency in a city can be tested. These include car crash data, speed limits, vehicle ownership data, annual kilometres/miles per person, population density, urban sprawl analysis, transport policy preferences, etc. The selected case study area i.e. Islamabad will be tested and analyzed on the basis of these indicators in Chapter 4.

CHAPTER 3

METHODOLOGICAL FRAMEWORK OF THE STUDY

3.1   Research Question and Problem Statement

In order to test the hypothesis that Automobile dependency is a consequence of modernist urban planning and that low-density areas are mostly automobile dependent, a broad range of literature was studied, covering the characteristics of modernist planned cities, what makes a city automobile dependent and the relationship between low-density and car dependency. Further, information was collected on Islamabad, the modernist planned capital of Pakistan, which was selected as a case study.

In order to test the hypothesis, census databases were studied from the official government resource; Pakistan Statistics Bureau, to check the low-density of Islamabad. Furthermore, plans and other information was gathered from CDA [18] officials to understand the local policy regarding suburban development, road development, transit, etc and stakeholders responsible for automobile dependency in Islamabad. Based on the information collected, Islamabad is analyzed in the light of the hypothesis and a conclusion is derived.

This research discusses auto-mobile dependency as a consequence of modernist urban planning or perhaps as a byproduct of the characteristics that make a modernist city. As discussed in the previous chapters, identifying characteristics of modernist planned cities has made them static, restricting the organic growth. Studies also show that the grid, a major element of modernist cities, has led to low-density sprawling development, and the birth of suburbs leading to increased automobile dependency

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[18] Capital Development Authority

in these cities. Imagined as a modern sustainable city, Islamabad was supposed to follow the concept of a Dynapolis; with the growth directed towards South-West in a linear pattern to cope with the urbanization of the city. But the expansion did not proceed as expected; the city that was supposed to grow from the center core expanded away from the urban areas making the center low in density. What the following years saw was a greater carbon foot-print with low-density; a norm of un-sustainable cities or suburbs of the world. The most affected have been the residents of Zone 5 of Islamabad; the area that is connected to center through Islamabad Expressway. This urban sprawl has also made usage of Public Transport along with walking and cycling ineffective because of long distances between places of work and residential areas. Due to the dependency on automobile, the spatial growth in Islamabad has been such that the centre as well as the peripheries are extremely low-density. Henceforth, Islamabad, a modernist city conceived in 1959, becomes a case study to explore:

- The relationship between auto-mobile dependency and modernist planned city
- The relationship between modernist planning and low-density
- The issue of low-density residential areas in relation to private car ownership.

Under the umbrella of the above mentioned aims of research, the following aspects will be explored as well:

a) To understand how land use zoning leads to low-density residential areas.

b) To explore the reasons of the development of suburban areas in modernist planned cities

c) To explore the relationship between rate of land, density and migration to suburban areas

d) To enumerate the stakeholders responsible of automobile dependency in Islamabad

e) To explore different ways through which automobile dependency can be decreased in such cities

The research focuses on the role of all the stakeholders; including both the private and public administration along with the characteristics of Islamabad masterplan which aid in automobile dependency. By looking at the history of the creation of Islamabad, and the salient features of the plan, it tries to compare and evaluate the features which lead to car dependency and unsustainability in the light of literature.

3.2 Reasons for selecting Islamabad

Islamabad, the Capital of Pakistan, is one of the newly planned cities of 20th century built on modernist principles alongside Ankara, Canberra and Brasilia (Caliskan, 2011). Similar to other modernist cities, Islamabad's urban development has been dominated and guided by Zoning according to Land use. With the paradigm shift in restrictive master planning, the over regulated nature of Islamabad's master plan favoring single-family houses and zoning serves as a case study to understand the factors leading to urban sprawl in such cities.

In terms of road infrastructure, transport decisions in Islamabad highlight prioritization to car over Non-motorized forms of transport. Doxiaids's documents for the Federal Capital show that the grid for master plan was developed on the basis of four highways that set the pattern for future development of the capital city. With the world moving towards sustainable development, the study of Islamabad helps to understand the features in a masterplan that contribute to auto mobile dependency.

With the Review of Islamabad Masterplan (2020-2040) in the pipeline, along with the worldwide discussions on suitable transport, the Problem statement served as a blueprint for improving automobile dependency in modernist cities through the case study of Islamabad. The author, having seen the transformation of Islamabad over two decades, provides valuable Naturalistic observation data, which can help in understanding the adaptive capacity of the city and the problems faced by it over the

years. Similarly, having worked with two of the most renowned architectural firms in Pakistan for more than 6 years, the author has access to practitioners and planners specifically designated in Capital Development Authority, who can comment on the growth of the Federal Capital.[19]

3.3   Research Process and Methodology

With the initial ideas being developed through personal observations of the author, the research was further refined through personal experiences while living in the city, as well as facing the problem of automobile dependency while commuting daily for work. Having researched deeply into the reasons of Islamabad's failure to live up to her title of a Modern Sustainable City in Urban Design Research during Bachelors of Architecture Program, the author juxtaposed the knowledge gained at university with the one learned as a firsthand experience in the field.

62 years since its inception, Islamabad is now growing from a city of a few thousands to millions. Perhaps that is why the study of all these layers and reviewing the masterplan is so important to understand the context and the subsequent problems faced by the city.

The initial ideas were followed by a systematic research method, enlisted as follows:

1. Identifying the modernist characteristics of Islamabad
2. Analyzing automobile dependency in Islamabad
3. Exploring whether Islamabad is low-density or not
4. Analyzing the changes in urbanization of Islamabad through secondary data to look at the subsequent urban sprawl over the years.
5. Identifying an area at MESO level to understand the issues and relationship between modernist planning and automobile dependency

[19] Islamabad

Initially, it is important to understand the characteristics of Islamabad masterplan that have lead to low-density and suburban sprawl. Furthermore, the initial ideas of masterplan development and how it was conceived is of utmost value to understand the defining characteristics that give preference to and promote usage of automobile instead of other modes of transport. This would help in understanding the research question and hypothesis and its relevance with the problems faced in the city.

In the first phase, the history and conception of Islamabad is studied along with its defining elements that make it a modern city. Next, its expansion over the years is studied to analyze whether it has taken up the predicted growth or taken another route. In order to analyze the second part of research question, the types of transport are examined in Islamabad. This is followed by enlisting the issues of traffic congestion in the city, the role of the stakeholders and their future plans. Then, an area is identified at the MESO scale, to test the hypothesis in detail. The area at MESO scale was analyzed according to the following parameters:

1. The location with respect to the Zero point of Islamabad.
2. The development of area, legality and history
3. The importance of the area in the current masterplan with respect to land use and quality of living
4. The stakeholders responsible for the development of area
5. The problems faced by residents of the area with respect to automobile dependency

Owing to the limitations of time and resources, an area of only one Zone of Islamabad is studied to test the hypothesis in detail. While some elements that test the hypothesis are studied at the MACRO scale, others are seen at MESO scale.

While it may be argued that selecting a single area to comprehend the issues of automobile dependency in Islamabad might create a generalization or lead to a conclusion that is reimagined, the use of different scales at MACRO and MESO level to study various parameters would help in countering this issue.

As discussed earlier, the parameters to test the hypothesis have been taken up from extensive literature review on Modernist planned cities, automobile dependency, suburban sprawl, sustainable transport policies, etc. These are tested in two parts:

1. Islamabad; the modernist city:
   - Land use and Zoning
   - Preference to Highway and Free-way
   - Urbanization patterns of Islamabad
   - Density Levels

2. Checking the levels of Automobile Dependency:
   - Transport Alternatives
   - Vehicle Data
   - Conditions for NMT
   - Current Transport policy preferences
   - Stakeholder analysis

3.4   Selection Criteria of Case Study

Islamabad is divided into five major zones namely:
- Zone I
- Zone II
- Zone III
- Zone IV
- Zone V

Zone IV despite being the largest in area has currently houses 83 illegal housing societies. The largest developed residential area is Zone I, divided by Sectors. Each residential sector is identified by a letter of the alphabet and a number, and covers an area of approximately 2 km × 2 km. (CDA, Facts & Statistics, 2007)

The issue of Automobile Dependency in Islamabad has been brought forward numerous times by the residents of the city. The administration's "Predict" and "Provide" approach has not helped the cause either. This, coupled with the Masterplan of Islamabad, which encourages highways and freeways development, has also been a point of discussion for its lack of adaptive capacity and static nature. Henceforth, both these issues were overlapped to understand the relationship between the two.

According to Real Estate Agencies forecast, Zone 5 has a promising social and economic future that would be attracting more people, not only from Islamabad but from other nearby cities as well. Currently, Zone 5 houses more than a quarter million people, which is at the consistent increase. Moreover, there is every possibility that the numbers get doubled within 10 years or so (Tahir, Islamabad Zone 5 – what does it hold for investors and the CDA?, 2019). Due to the rapidly changing demographics of Zone 5, investors have been demanding CDA for a solution to the transport issues of the area and amend the bye laws as applied in the original Masterplan of Islamabad.

Hence, Zone 5 was selected as a case study on the basis of its location from the centre, the problems faced by its residents due to traffic congestion and being labelled as the most promising investment opportunity in Islamabad by real estate agencies of the Twin cities[20] (Tahir, Islamabad Zone 5 – what does it hold for investors and the CDA?, 2019).

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[20] Islamabad and Rawalpindi

Location of Case Study

Zone 5 lies in the South, between southwest and southeast of Islamabad Capital Territory (ICT) limits. It covers an area of 39,029 acres of land and is extended to 157 square kilometres. Currently, it houses 25 residential schemes and socities including the renowned Defence Housing Authority (DHA), Bahria Town sectors (Bahria Garden City and Phase 7), Jinnah Gardens, Naval Anchorage and Zaraj Housing Society. Zone 5 shares its border with Rawalpindi near Bahria Intellectual Village in the south; Sangot Syedan separates it from Kahuta in the north; while Gulberg Residencia lies at the cusp of Zone 4 and Zone 5.(Figure: 3.1) Main arteries connecting Zone 5 to its neighbouring areas are Kahuta Road, T Chowk, GT Road and Islamabad Expressway.
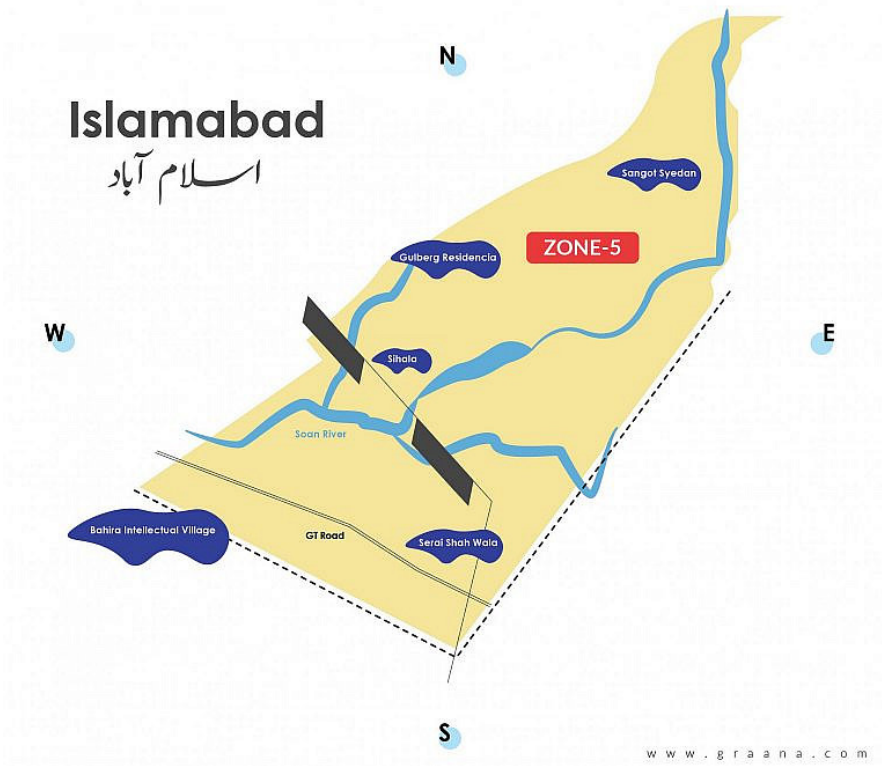
Figure 3.1. Location of Zone 5, Islamabad. Source: https://www.graana.com/blog/islamabad-zone-5-what-does-it-hold-for-investors-and-the-cda/

Islamabad Expressway connects more than a quarter million people living in Zone-V, which includes more than 20 housing societies, to their schools, offices, and businesses in Islamabad. It is worth noting that the Islamabad Expressway not only connects Zone 5 to the center but also acts as a gateway to other cities of Pakistan by connecting Islamabad to Grand Trunk Road at Rawat. (Figure: 3.2) Due to this reason, the highway has a fair share of load of heavy vehicles as well.
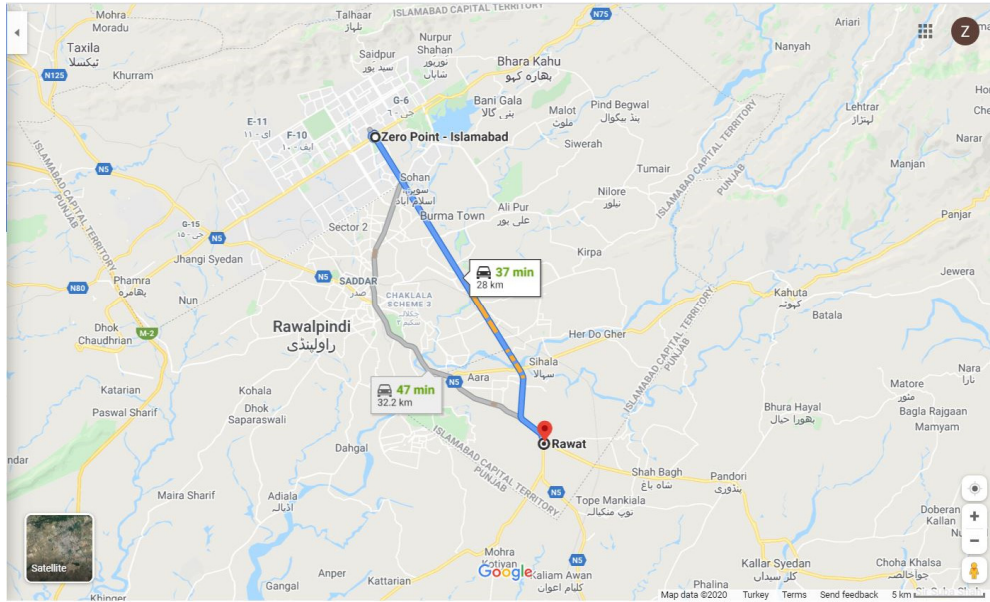
Figure 3.2. 28km long Islamabad Expressway connecting Zero Point Islamabad to Zone 5 and GT Road at Rawat. Source: Google Maps

As a solution to the increasing traffic issues, it was proposed by the CDA to convert Islamabad Expressway into a signal-free corridor from Zero Point to Rawat while expanding it from a 2 lane to a 5 lane road.

The work on this project has been snail paced, with the first three phases (from Zero Point to Koral Chowk) taking 4 years to complete. The fourth phase (from Koral Chowk to Rawat) which is technically the worst part of the highway in terms of condition and traffic, is yet to be started (Figure:3.3). The 15km long patch in question is a two lane road which not only provides access to over 20 housing societies but also to the heavy traffic that needs access to the Grand Trunk Road.
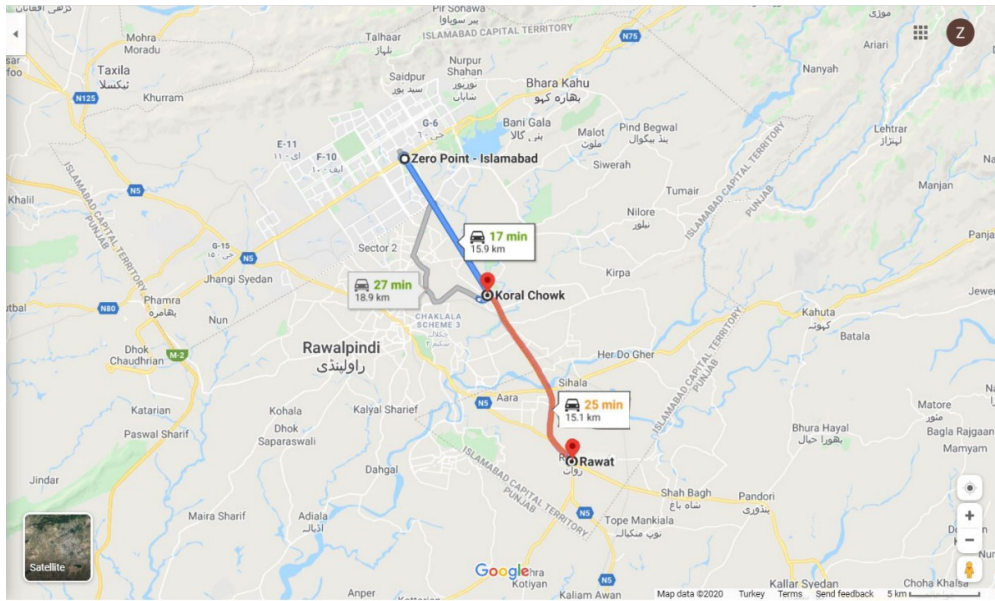
Figure 3.3. The first three phases of Signal-Free Corridor, from Zero Point Islamabad to Koral Chowk. (12.9km length were completed in 4 years) as shown in blue. The fourth phase of Signal-Free Corridor, from Koral Chowk to Rawat is shown in Red (15.1km length is still pending). Source: Google Maps

This in turn creates a horrendous bottleneck which has now made it a norm for the residents of Zone-V to be stuck in traffic for a couple of hours every single day.(Figure: 3.4) All over Pakistan, there are bypasses for heavy traffic so that they cannot enter the main city, but unfortunately, for residents of Zone-V, there seems to be no relief and the concerned authorities have turned a blind eye to this horrible injustice. Not only does this increase commute times by 2-3 times, it also prevents ambulances from reaching patients/hospitals.
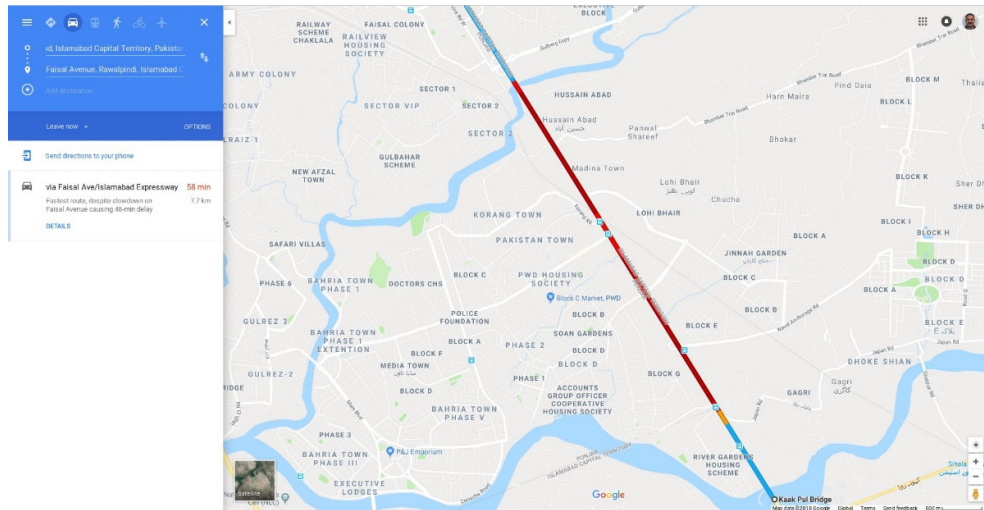
Figure 3.4. A Picture fetched from Internet during peak time of 6pm shows how a part of 7.7km in this 15km long patch will be covered in 58 minutes. Source: https://twitter.com/IndepObserver/status/1016606324929462272/photo/1

The location of Zone 5 of Islamabad is 28kms away from the centre, i.e. Zero Point of Islamabad. The low-density and high rates in the centre has forced the residents to move towards the suburb, which is Zone IV and Zone V of Islamabad. The provision of highway, as conceived in the original masterplan has only led to traffic congestion and shows a missing layer of Public Transport. Moreover, due to the land use policies of the Capital, Work, education and residence are segregated which increases the commute time of the residents. Furthermore, a neglect for other modes of transport has led to automobile dependency in this area, as seen initially through personal observations.

3.5   Execution of Research: Data collection and analysis

As discussed earlier, being a resident of Islamabad, initial ideas, that were developed by author's personal experiences and observations were further strengthened by extensive research and literature review to develop a hypothesis and further refine

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the problem statement. Beginning with Naturalistic observation, both exploratory and retrospective methods were used to test the hypothesis.

The research aims to explore the relationship between automobile dependency and modernist planned cities, while trying to find out the reasons why modernist planning characteristics lead to low-density and urban sprawl simultaneously promoting car dependency. Hence, in the first part, Islamabad will be discussed in detail, with regards to its history and inception, the original masterplan and its defining characters and how these have promoted the phenomena of automobile dependency.

The research in this part has been done with the help of existing data on Islamabad, through documents, reports, books and articles available at various platforms. Several Government officials also helped in obtaining information that help in understanding the characteristics of Islamabad that lead to automobile dependency.

This was done through obtaining relevant documents from Capital Development Authority (CDA) Secretariat in Islamabad and online sources like Doxiadis.org. In order to analyze the future aspirations of Islamabad administration with regards to Islamabad masterplan, Interim report on "Review of Master Plan of Islamabad (2020-2040)" prepared by Federal Commission, was studied thoroughly to understand how the problem of traffic congestion and the missing layer of Public transport is dealt with the relevant authorities. Original masterplan with subsequent changes was also obtained through CDA and overlapped with data from existing satellite maps of Islamabad to analyze the changes in urbanization.

Furthermore, information was gathered from National Database and Registration Authority (NADRA) and Pakistan Bureau of Statistics to obtain data on the population of Islamabad according to Zones and Sub-sectors for Meso analysis, in order to map the population density. Property value data was obtained from recognized private Real Estate agencies to gather information regarding the land value according to Zones in Islamabad. Land use analysis was done with the help of data obtained from CDA, along with the details available on Google Maps.

In order to analyze the issue of automobile dependency in Islamabad, vehicle ownership data in Islamabad was obtained from Excise and Taxation Office (ETO) and Islamabad Capital Territory administration (ICT). Local Transport routes were mapped with the help of data obtained from Bus Stand Management at Faizabad, Islamabad. Other parameters to check automobile dependency as seen in Chapter 2, like Speed Limit, Traffic Congestion and Car crash data was obtained from Islamabad Traffic Police (ITP) and Pakistan Bureau of Statistics.

The hypothesis has been tested through both Primary and Secondary data; primary in the form of Natural observations and discussions with relevant authorities in CDA, ITP, ETO and Real Estate Agents; whereas the Secondary data that was obtained in the form of demographics, statistics and archival research was used for mapping purposes. After gathering information on the most affected areas of Islamabad due to automobile dependency, the focus is shifted to Zone 5 of Islamabad, where Ped Shed analysis is used as to analyze the problem at hand. This is further strengthened through performing corelational studies of data obtained from the sources mentioned earlier. This is further backed up by Stakeholder analysis to understand the actors behind the automobile dependency in Islamabad.

The literature review and personal observations helped in shortlisting these methods to test the hypothesis. In the first phase, modernist characteristics in Islamabad are outlined which are leading to issues, that, according to literature may cause unsustainable development. In the second part, the current conditions and statistics are analyzed to check whether Islamabad is a automobile dependent city or not. Finally, both of these results are overlapped to identify whether the automobile dependency Islamabad a consequence of Modernist urban planning? The research and data collection is based on the following main themes:

• **Understanding the Modernist Plan of Islamabad**

1. The Original Masterplan and the subsequent changes
2. Zoning and the issue of static Land use
3. Checking Low-density in Islamabad

4. Sub-urban sprawl in Islamabad; understanding the factors

5. Stakeholders in Islamabad Masterplan implementation and revision

• **Automobile Dependency in Islamabad**

1. Preference to Automobile in original Masterplan of Islamabad

2. Distances between land use

3. Presence of other modes of Transport

4. Stakeholders in Public Transport System in Islamabad

5. Vehicle Ownership, Traffic congestion, speed limits in the city

6. Vision and Preferences of administration for Public Transport in the revised Masterplan

7. Environment for Non-motorized Transport (NMT)

• **Overlapping modernist plan with Automobile dependency**

1. Relationship between Sub-urban sprawl, residential density and price of land

2. Distances between land use and the ease to use NMT

3. Presence of Highways as compared to infrastructure for NMT

4. Priority of Stakeholders between Predict and Provide or Predict and Prevent Approach

5. Vehicle Ownership comparison with denisty

The following methods have been used to conduct research at various scales:

No	Research Methodology	MACRO LEVEL	MESO LEVEL	MICRO LEVEL	Sources
		Islamabad			
1.	Morphological Analysis	Plans from 1960 to 2009			CDA

		Transport Network			CDA
		Road Hierarchy			CDA
2.	Content Analysis	Transport Policy of Islamabad from 1960-2022			CDA
		Automobile preference in Original masterplan of Islamabad			CDA
3.	Density Analysis	Population over the years		Population Density of Sub-sectors	Site Visit NADRA PBS
		Dwellings per hectare			
4.	Demographics	Property Value		Property value of Sub-Sectors	Real Estate
		Car Crash Data			PBS
		Mileage per year			
		Vehicle Ownership Data			ETO, ITP

5.	Land Use Analysis			Ped Shed Analysis	Site Visit Google Maps CDA
		Distances between essential land use/ zones			
6.	Site Observation		Traffic Congestion	NMT presence	Site Visit
				Speed Limits	
7.	Stake Holder Analysis				CDA

As discussed earlier, the research problem finds its basis through personal observations of the author. However, to understand the problem at hand in depth, Ped shed analysis was done in selected areas to test the hypothesis by implementing the parameters and indicators suggested in scholarships. Similarly, site visits were done during peak traffic hours the on the most congested highways to understand the problem in depth and further refine the personal observation. This data was overlapped with statistics and demographics collected from the above mentioned resources as well with the work done by others on Islamabad to test the hypothesis and reach a conclusion.

The following Personnel were contacted in order to obtain information and collect data regarding the Master Plan of Islamabad and evolution as well as the indicators through which automobile dependency could be measured in the city. The interviews

were informal and only aimed to obtain data for mapping and documentation purposes. Names of the personel have been removed for confidentiality.

No.		Time of Interview	Occupation and Status
1.	Interviewee 1	15 June, 2022	Director (Masterplan) Planning Wing, CDA
		16 June, 2022	
2.	Interviewee 2	16 June, 2022	Assistant Director Directorate of Traffic Engineering and Transport Planning, CDA
3.	Interviewee 3	17 October, 2022	Directorate of Metro Bus, CDA
4.	Interviewee 4	24th October, 2022	Assistant Sub Inspector, Islamabad Traffic police
		7th November, 2022	
		14th November, 2022	
5.	Interviewee 5	15th December, 2022	Member, Economic Statistics, Pakistan Bureau of Statistics

3.6   Assessment of The Research; How it can be improved and increasing Validity of the Data

The research process began with Naturalistic observation, followed by sample study, using correlation, retrospective and exploratory methods as well. Multiple sources and techniques were used to collect information and enrich the data. Ped Shed Analysis was marked on copies of masterplan obtained from the CDA and later converted to digital forms. Similarly, congestion was marked physically while visiting the points of concern and nodes during peak times. Apart from this, visits

were made to CDA, NADRA, ETO and ITP headquarters for the collection of relevant data.

However, due to the research being conducted during COVID-19 pandemic and high level of political instability in Islamabad, earlier planned interviews with users could not be conducted, which may have enriched the data further. Similarly, there might have been some Coverage error due to the type of sampling technique. Due to the time constraints, only one Zone of Islamabad was studied along with 2 sub-sectors to test the hypothesis.

3.7   Ethical Considerations

While collecting data from various organizations, the identity of the author as well as the research purpose was made clear to all the officials. Information regarding price/Sft of different zones was collected from Real Estate Agents rather than asking the residents directly to ensure no ethical problems occur. Overall, the research has been duly cited by giving proper references and holds authenticity.

CHAPTER 4

ISLAMABAD AND AUTOMOBILE DEPENDENCY

This chapter explores the city of Islamabad in detail. Where the first part looks into the history of the city and explores the modernist characteristics; the second part discusses the problem of Automobile dependency in the city. The first part of the chapter looks into detail that why a new capital was needed, the concept behind the development of Islamabad along with the initial ideas. This aids in understanding the first part of the Problem statement; Islamabad-as a modernist city.

The second half of the chapter looks at the characteristics of Islamabad that render it unsustainable. The problem of Automobile dependency is also explored while looking at the characteristics of the city that make it so. It further explores the Stakeholders involved in decision making; specifically for the issues related to transport in Islamabad. Indicators mentioned in Chapter 2 of the thesis provide a guideline as to which characteristics need to be explored. Further, the methodology listed in Chapter 3 has been used to map and enlist these findings.

4.1   PART I: Islamabad-The New Capital

After independence in 1947, the new State of Pakistan realized in a few years that the layout of Karachi was not suitable for a Modern Federal Capital. Hence, the summer of 1959 came with the announcement of a location for the new Capital of Pakistan. Situated on the Potwar Plateau towards the North of Rawalpindi, the current site for Islamabad (Figure:4.1) was suggested by Dr. C.A. Doxiadis, who was selected as an advisor to the Special Commission set up to decide the location of capital city. It was decided that Rawalpindi will act as a facilitator for the new capital in terms of transportation, water supply, communication means etc during the first few years of development. Before discussing the city of Islamabad, it is important to

understand the history behind the city and the country as well as the need of a new capital.
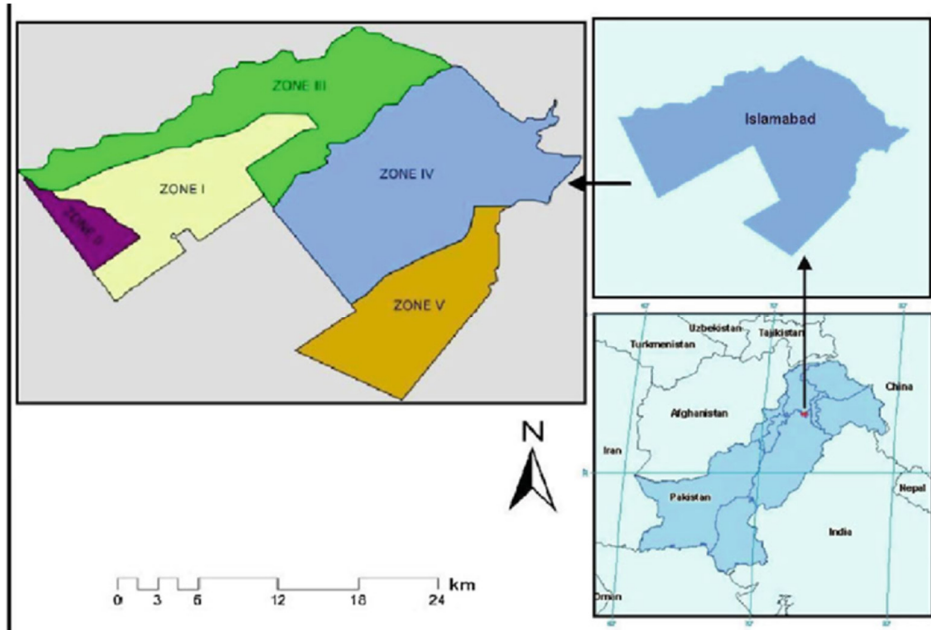
Figure 4.1. Location of Islamabad on Pakistan Map and her subsequent zones. Source: (Butt, M. & Waqas, Ahmad & Iqbal, Muhammad & Muhammad, Gul & Lodhi, M.., 2011, p. 2)

4.2   Independence of Indian Subcontinent and the Aftershocks of migration

Famously known as the Partition of British India, the Indian subcontinent saw a change of political borders in August 1947. Consequently, Pakistan got its independence on 14th August, 1947 while India declared independence the following day i.e. 15th August, 1947. Till 1971, Pakistan consisted of two non-contiguous areas; East Pakistan (current day Bangladesh) and West Pakistan (current day Pakistan). (Figure:4.2)

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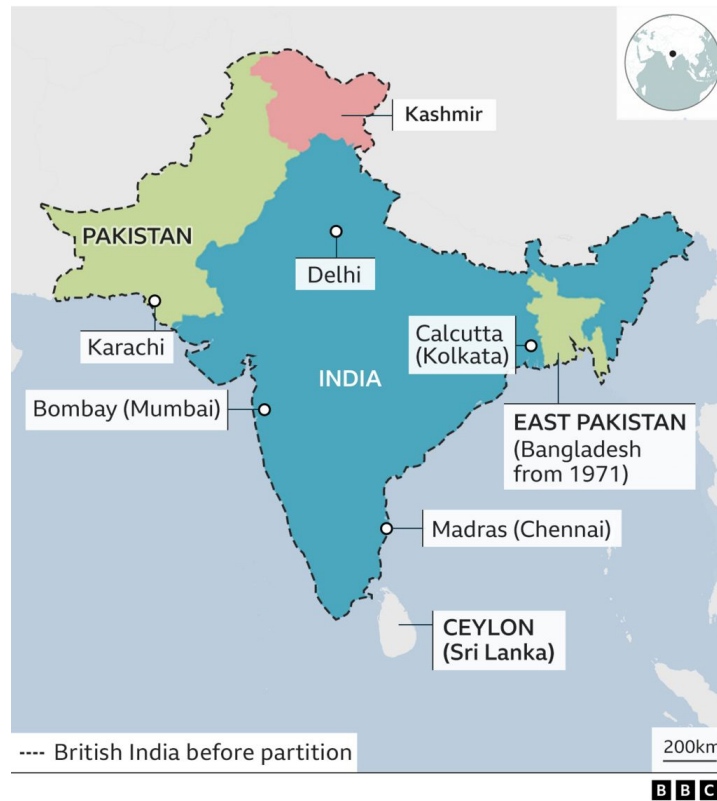
Figure 4.2. Partition of India and Pakistan in 1947. Source: (BBC, 2022)

Soon after Independence, Pakistan required are a new capital. During the initial phase, Karachi was an automatic choice for playing the role of capital post-independence, since it was a large city, coupled with the convenience of not only having an airport but a seaport as well. However, this was never considered a permanent solution due to the climatic conditions, the existing traditions and culture of the city (the capital being a part of the province of Sindh), existing buildings; neither adequate in number nor having the infrastructure to sustain the responsibility of having State machinery (Constantinos and Emma Doxiadis Foundation, 2003-2022).

Apart from the issues with the layout and structure of Karachi, which failed to adapt or take up the functions of a modern capital, the influx of refugees also increased the problems faced by the port city. At one point, it seemed as if the new government

had underestimated the influx of migrants that the capital city would receive; during a period of 4 years (1947 to 1951), it is estimated that more than 0.6 million refugees migrated to Karachi (Hassan, 1992). Soon enough, Karachi's infrastructure was overburdened with refugees being accommodated in existing public buildings, parks and other open spaces. This led to the formation of Karachi Improvement Trust (KIT) in 1950, later converted to the present day Karachi Development Authority (KDA) in 1957, to aid in the rehabilitation of refugees in Karachi. (Wikipedia contributors, 2022) This followed by the appointment of a Swedish consultancy firm, Merz Rendel Vatten (MRV) by the institutions to develop a masterplan for Karachi, owing to her rising problems and refugee crisis. The Greater Karachi Plan was expected to accommodate, the now 1 million population[21], of Karachi apart from the additional 5% of civil servants and migrants coming from within Pakistan. However, the political unrest followed by the assassination of Prime Minister Liaquat Ali Khan in 1951, led to the shelving of the MRV proposal (Hassan, 1992).

However, in 1958, the then military government of Pakistan, led by General Ayub Khan, invited Greek planner and architect Constantinos Apostolos Doxiadis (C.A. Doxiadis) to prepare another scheme for Karachi, known as the Greater Karachi Resettlement Plan (Hassan, 1992) (Figure 4.3 and 4.4). The new President along with his cabinet, had aimed to discourage refugees and the low income/ working group migrants from other cities of Pakistan, to settle in the city centre. His idea to adjust the refugees and intra country migrants in new settlements within six months led to the bifurcation of the city into income groups (Soomro & Soomro, 2018).

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[21] This includes the existing 0.4 million population at the time of partition in 1947 and the incoming 0.6 million refugees between 1947 and 1951. Source: (Hassan, 1992)
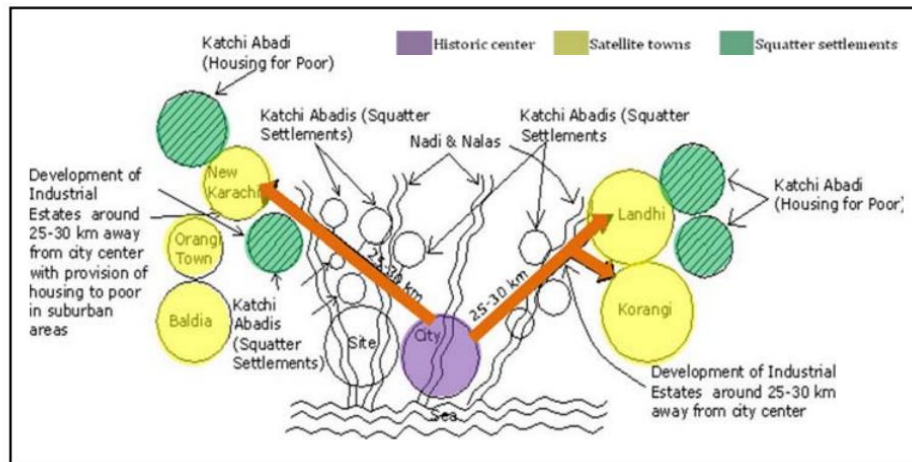
Figure 4.3. Proposed Recommendations Of The Greater Karachi Resettlement Housing Plan 1956-1958. Source: (Soomro & Soomro, 2018)

Figure 4.4. Greater Karachi Resettlement Housing Program, Map Published In Brochure, 1962. Source: (Soomro & Soomro, 2018)

This proposal of developing new satellite towns for inter and intra country migrants eventually led to the nomination of C.A. Doxiadis, for developing the new capital of

Pakistan. The move came as a result of two factors; one that Doxiadis and his study of Ekistics had earlier proposed solutions to urban crisis in the postindustrial era of 20th century and secondly, he was associated with Ford Foundation, which was established in 1936 as a public welfare organization with global philanthropic projects aimed at advancing human welfare and was involved with Pakistan for the resettlement of refugees (Khwaja, 1998).

4.3   The Solution; a New Capital?

After multiple attempts to accommodate the functions of a Capital in Karachi, the government of Pakistan, under the leadership of H.E. the President of Pakistan, Field Marshal Mohammed Ayub Khan, decided to move towards the idea of a new capital. In February 1959, a special commission was established to study this issue at hand, with Dr. C.A. Doxiadis being named as an advisor to identify the Location of the Capital.

4.3.1   Choosing the Site

As a result of the Special Commission known as the Federal Capital Commission (FCC) formed for the establishment of the new capital, a report was issued by Dr. Doxiadis along with the other members of the committee, suggesting two areas for the new capital, one outside Karachi and the other to the north of Rawalpindi. The Commission was extensive, having fourteen sub-committees comprising of 100 Pakistani specialists including committee on Geographic and Climatic Factors, Social and Cultural Factors, International Relations and Defense Factors, in order to make a rational decision on the selection of site for the new capital.

These recommendations were reviewed by President Mohammed Ayub Khan, resulting in the selection of the site North of Rawalpindi, on the Potwar Plateau in June 1959. This was followed by the preparation of a report by C.A. Doxiadis, which

would facilitate in preparing for the next stages of the work, especially regarding the setting up of a commission for building the new capital and setting up a programme of action. As a result, a site visit was made by C.A. Doxiadis in August 1959 resulting in the issuance of report "Impressions from the site – The necessary data" (Constantinos and Emma Doxiadis Foundation, 2003-2022, p. 1).

Situated on the Potwar Plateau towards North of Rawalpindi, the current site for Islamabad was selected with Rawalpindi acting as a facilitator for the new capital in terms of transportation, water supply, communication means etc. during the first few years of development. It is interesting to note the proximity of Rawalpindi with the new capital of Pakistan. Conceived during military rule of President Ayub Khan, the new capital is situated only 20km away from Rawalpindi; hosting the military headquarters of the country. This way, Ayub Khan not only isolated the capital away from the existing urban centers of the country as well the provinces but also tried to "legitimize his rule to a global audience" (Kalia, 2011, p. 67). On 24th February, 1960, the New Capital of Pakistan was named Islamabad (The City of Islam) by President Ayub Khan and his cabinet, which could be considered as the official day of inception of the new Capital (Constantinos and Emma Doxiadis Foundation, 2003-2022, p. 2).

4.3.2   Rawalpindi and Islamabad; the twin cities

It was decided that Islamabad and Rawalpindi will be developed as twin cities; both complementing each other without physical intermingling, that is because Doxiadis did not want Rawalpindi to become an annex to Islamabad (Constantinos and Emma Doxiadis Foundation, 2003-2022). Islamabad was to serve as the capital, taking up administrative and cultural functions whereas Rawalpindi was expected to serve as a regional centre serving industrial and commercial functions (Constantinos and Emma Doxiadis Foundation, 2003-2022).

This way, Rawalpindi provided the new Capital facilities such as airport, water supply, and existing railway and highway connections and also met with the initial housing needs of Islamabad, cutting the cost of installing these facilities and services in the initial development phase. Despite this, it was feared that the proximity of Rawalpindi might invade the new capital by the former's old city fabric, which not only posed a challenge to accommodate modern technologies but also lacked the efficiency and clarity of a modernist planned city. In order to provide a distinction between the two cities; a porous border rather than a boundary was created in the form of a green belt, a highway, and a zone of light industries. The distinction was further enhanced by the grid iron master plan of Islamabad, overlaid by segregation done on the basis of land use.

4.4   Islamabad-The Modernist Capital

Islamabad was conceived as a modern sustainable city by Doxiadis; by using planning principles he formulated under the discipline of Ekistics[22]. Similar to Brasilia in Brazil and Chandigarh in India, Islamabad was inspired by the modernist principles of the 20th century, particularly those advocated by Congrès internationaux d'architecture moderne (CIAM)[23].

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[22] Doxiadis defines Ekistics as the science of Human Settlements. In his own words: *"In order to create the cities of the future, we need to systematically develop a science of human settlements. This science, termed Ekistics, will take into consideration the principles man takes into account when building his settlements, as well as the evolution of human settlements through history in terms of size and quality. The target is to build the city of optimum size, that is, a city which respects human dimensions. Since there is no point in resisting development, we should try to accommodate technological evolution and the needs of man within the same settlement."* (Doxiadis, Ekistics, the Science of Human Settlements, 1970)

[23] CIAM (1928-1959) was an organization, composed of the most notable architects of that time, responsible for arranging events, congress and seminars to spread the principles of Modernist Movement in all facets associated with architecture and planning (Wikipedia contributors, 2022)

Following the fourth CIAM congress in 1933, one of the most prominent members of the congress, Le Corbusier, presented the idea of "The Functional City" in The Athens Charter (1943). This idea was based on the main theme of 4th Congress of CIAM, which covered the analytical study of 33 cities, based on the idea of a Functional City; where land planning would be based upon zones segregated according to functions (Mumford, 2000). According to this concept, the city was divided into four functions, namely, living, working, recreation and circulation. Owing to the problems faced in the industrial city and the rising health issues of the residents, the idea of the Functional city was to demarcate all the functions into separate zones so that the Modern city can function efficiently (Mumford, 2000):

> *"CIAM demanded that housing districts should occupy the best sites, and a minimum amount of solar exposure should be required in all dwellings. For hygienic reasons, buildings should not be built along transportation routes, and modern techniques should be used to construct high apartment building spaces widely apart, to free the soil for large green parks."* (Mumford, 2000, p. 85)

These guidelines were translated into The Athens Charter, which was a document about urban planning, published by Le Corbusier in 1943, combining his work on Radiant City (1935) and the urban studies taken up by CIAM 4th Congress in 1933. The Athens Charter had a huge impact on planning thought after World War II (Curtis, 1996). This vision of functional segregation and zoning was consequently translated in all most of the cities built during that time period so as to achieve the efficient functionality of a modernist city.

Islamabad's masterplan takes it influence from the same guidelines; conceived in 1960 by Doxiadis, the main feature of the plan is the segregation of land use in different zones, connected by an efficient transport network. Imagined as "The City of Future", Islamabad was planned to accommodate 2,500,000 inhabitants within a period of two generations. Built on the concept of Dynametropolis, the original masterplan comprised of three areas namely:

a) The area of Islamabad proper

b) The area of Rawalpindi, the centre of which is the city of Rawalpindi

c) The National Park area, which will be used for agricultural purposes apart from having limited land use area for a national sports center, the national university, national research institute, etc.
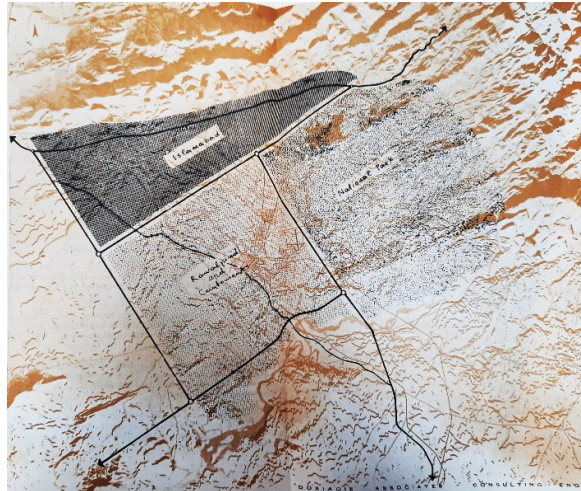
Figure 4.5. The three parts of Metropolitan Area. Source: (Constantinos and Emma Doxiadis Foundation, 2003-2022)

The initial idea was that both Islamabad and Rawalpindi will expand dynamically towards the southwest along with their central cores (blue area- spine of central facilities) with least possible adverse effects in traffic (Frantzeskakis J. M., 1995). The National park, on the other hand, is confined between the hills and Soan River to the South East. Like other modernist cities, the chief characteristic or in Doxiadis words "The Backbone" of the Islamabad Masterplan is formed by two highways, namely Islamabad Highway and Murree Highway. The orientation of these highways was dictated by the existing natural landscape, running from North East to South West along valleys formed by a series of hills running in the same direction as well as man-made obstacles. In total, four major highways (1200ft. wide) namely Murree Highway (now Kashmir Highway), Islamabad Highway, Soan Highway and Capital Highway were planned to connect the above mentioned areas at right angles, forming a big square, which will define all future transportation systems and all major

functions within the metropolitan area (Figure:4.6). However, 62 years since its inception, Soan and Capital Highway are yet to be realized.
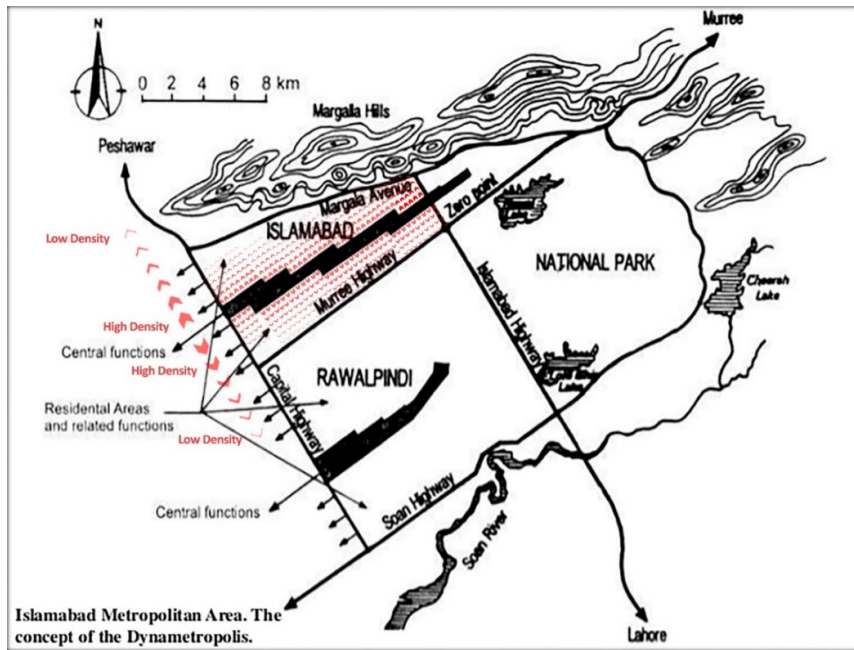
Figure 4.6. The four main proposed Highways. Source: https://www.scribd.com/presentation/432746177/The-Dynametroplis-Concept-14#, Edited by Author

Imagined as the City of Future; the masterplan was such that it had the flexibility to allow for future expansions of both cities from the center. This was a shift from the cities of the past which were static; here, Doxiadis had planned each city to develop dynamically towards the south-west, along with their center cores growing simultaneously and together with their residential and other functions (Constantinos and Emma Doxiadis Foundation, 2003-2022, p. 4).

In Doxiadis's Masterplan of Islamabad, the Dynapolis did not have a single centre; the capital city was imagined as a poly-nuclei city rather than having a single centre. This way, the Dynapolis was imagined to be a collection of centres serving as a basic planning module for the Capital city, known as the "Sector". Each sector, having an area of approximately 2km x 2km, was further subdivided into Sub-Sectors. Each

sector has a Sector Centre i.e. "Markaz" fulfilling all required land use for the Sector. Similarly, each Sub-Sector has a smaller center as well i.e. the Market. The city can be read through four main functions: (Figure:4.7)

a) **Residence**
b) **Transport**
c) **Recreation**
d) **Work**

Principles of planning in Islamabad comprise of the unity of purpose, the hierarchy of functions, freedom to develop dynamically and design for all dimensions of a modern city (humans, cars, airplanes, etc).

a) Residence
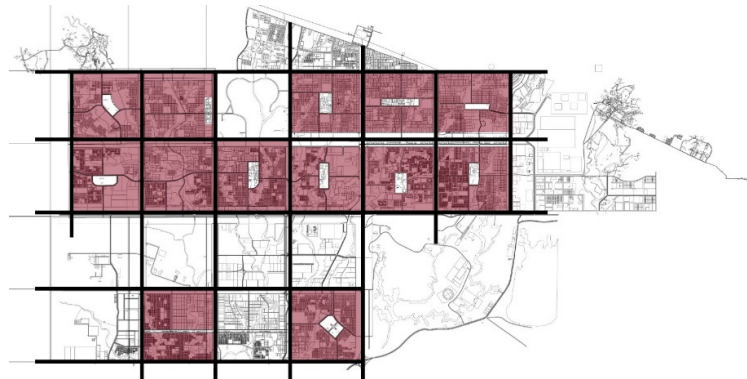
b) Transport

c) Recreation

d) Work

Figure 4.7. Functional Zoning in Islamabad Masterplan. a) Red squares show Residential area. b) Black lines define road network. c) Dark red areas show Recreational area. d) Grey areas show industrial and work areas. Source: Author

All the administrative landuse has been placed at the heart of Islamabad, from where it spreads towards and then along the hills. The Commercial Hub that is the Central Business District (CBD), (currently known as Blue Area), is in the form of strip running South-West along the main Jinnah Avenue.

Despite Doxiadis' proposal having guidelines for both Islamabad and Rawalpindi, the Masterplan and the idea of Dynapolis was only applied to the New Capital, Islamabad. Imagined as a modern sustainable city, Islamabad was supposed to follow the concept of a Dynapolis; with the growth directed towards South-West in a linear pattern to cope with the urbanization of the city. But the expansion did not proceed as expected; the city that was supposed to grow from the center core expanded away from the urban areas making the center low in density. What the following years saw was a greater carbon foot-print with low-density; a norm of un-sustainable cities or suburbs of the world. Islamabad suffered at the hands of unregulated expansion which resulted in huge amounts of deforestation.

Similarly, the sector center was imagined to be the core of a sector dividing each of these units into 4 equally sized parts, which in reality did not work as expected, and the growth along east-west axis with a dynamic expansion is not achieved. Moreover sectors became such static and fixed that instead of expanding to further development areas, the population got stuck inside the grid boundaries and centers do not function properly (Figure:4.8). The following section explains the Sector, Zoning, Landuse and Grid of Islamabad, which has not followed the expected growth of direction, leading to Sub-urban sprawl and Low-density in the centre.

Figure 4.8. Sector centres in Islamabad Masterplan shown in blue. The yellow line shows anticipated direction of growth towards South West direction. Source: Author

4.4.1 The grid city

According to Doxiadis, Islamabad represents the study of human settlements in a systematic way, and translates the theory of Ekistics (Doxiadis, Islamabad. The Creation of a New Capital, 1965, p. 1). It is of utmost significance that apart from the three dimensions in which a human settlement could be read, importance should be given to the fourth dimension i.e. time, without which a settlement cannot exist. In order to create a new settlement, it was important to connect efficiently the five elements of nature, namely, nature, man, society, networks (roads, power, etc) and shells (houses and buildings). A of combinations of these elements could be used to build new settlements (Figure: 4.9) (Doxiadis, Islamabad. The Creation of a New Capital, 1965, pp. 7-8)

a. Nature alone

b. Nature with networks

c. Nature with shells

d. Nature with networks and shells
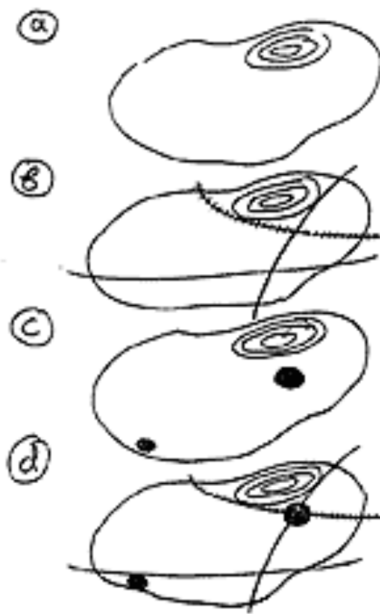
Figure 4.9. Combination of Elements. Source: (Doxiadis, Islamabad. The Creation of a New Capital, 1965)

Despite the first three solutions creating the least commitments for the new settlements, there are neither easy to achieve nor economically viable. However, the last combination is not only the easiest and cheapest for economy of developing countries, but also guarantees maximum success by developing relationship between the elements.

In the Islamabad Masterplan, Doxiadis eliminated the curves in the basic axes by designing them at right angles to each other. This way, a rational design was achieved defined by the coordinates following the directions of axes of landscape, that runs from North East to South West and North West to South East.

The Masterplan proposed a grid network that must be formed only through a system of straight axes running at right angles to each other, solid in nature so as to adapt to the "Motor Car" of the city (Associates, 1960). The guidelines strictly defined that

the Grid must have large squares. Thus the Metropolitan Area will be based on a system of axes serving the through traffic, in the best possible way with the motor cars crossing each other only at a distance of approxiamately 2000 yards. The grid was defined by C.A. Doxiadis as:

> *"Thus it is within solid squares, the sides of which will be controlled by cars, that will include human communities of smaller sizes."* (Associates, 1960, p. 252)

These guidelines highlight two important features of the Islamabad grid;

- The modular squares were to follow a rigid pattern, making the sectors static in nature
- The grid was developed in accordance to the scale of motor car, which gave preference to car over pedestrians.
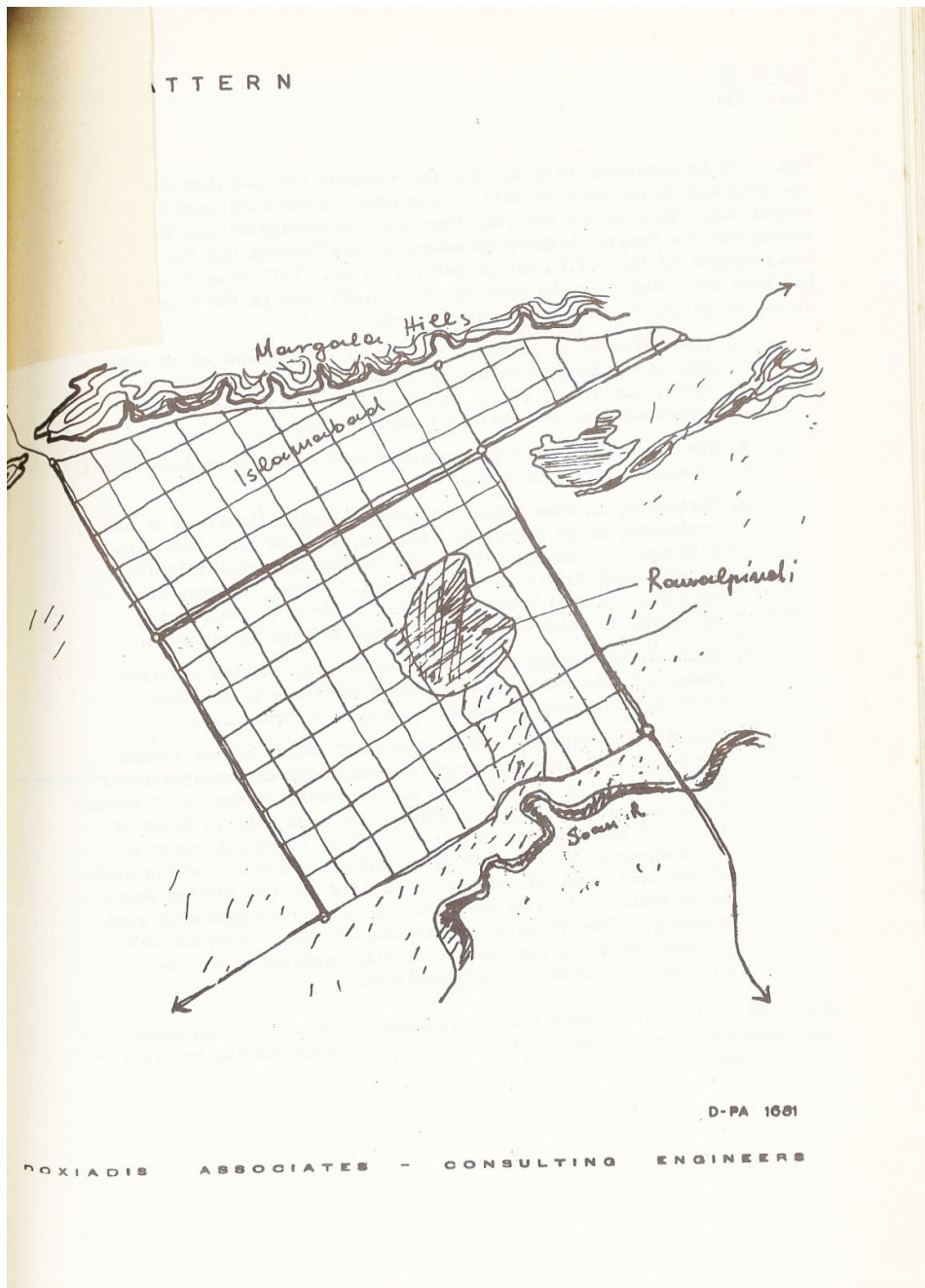
Figure 4.10. The Islamabad Grid. Source: Islamabad Program and Plan, Vol:2, D-PA 1681

4.4.2   Zoning and The layout:

In Doxiadis plan, Islamabad and Rawalpindi were to be developed as twin cities where Islamabad was to provide administrative functions with Rawalpindi providing the Regional services undertaking the industrial and cultural functions. Imagined as a Dynametropolis, the masterplan of both cities was supposed to grow from the center along with the expansion of functions, developing dynamically towards the south-West. The plans were anticipated to have the flexibility to expand from the center.
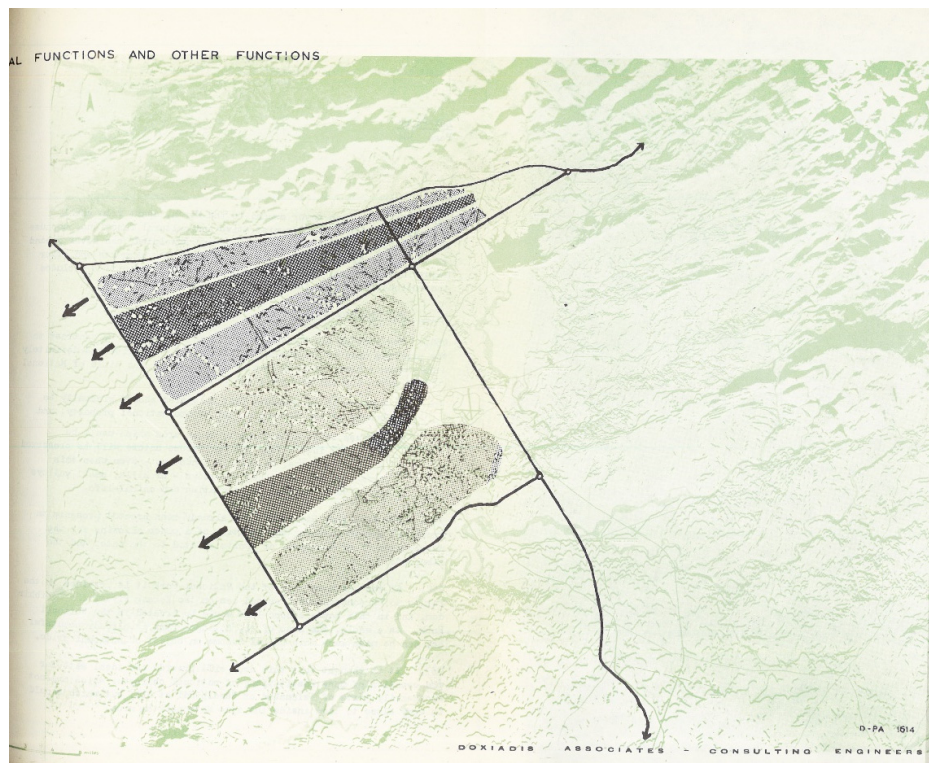
Figure 4.11. The central functions of Islamabad and Rawalpindi. Source: (Doxiadis)

According to the Master Plan, the Metropolitan Area was divided into three parts:

1. Islamabad
2. National Park

3. Rawalpindi and the Cantonments
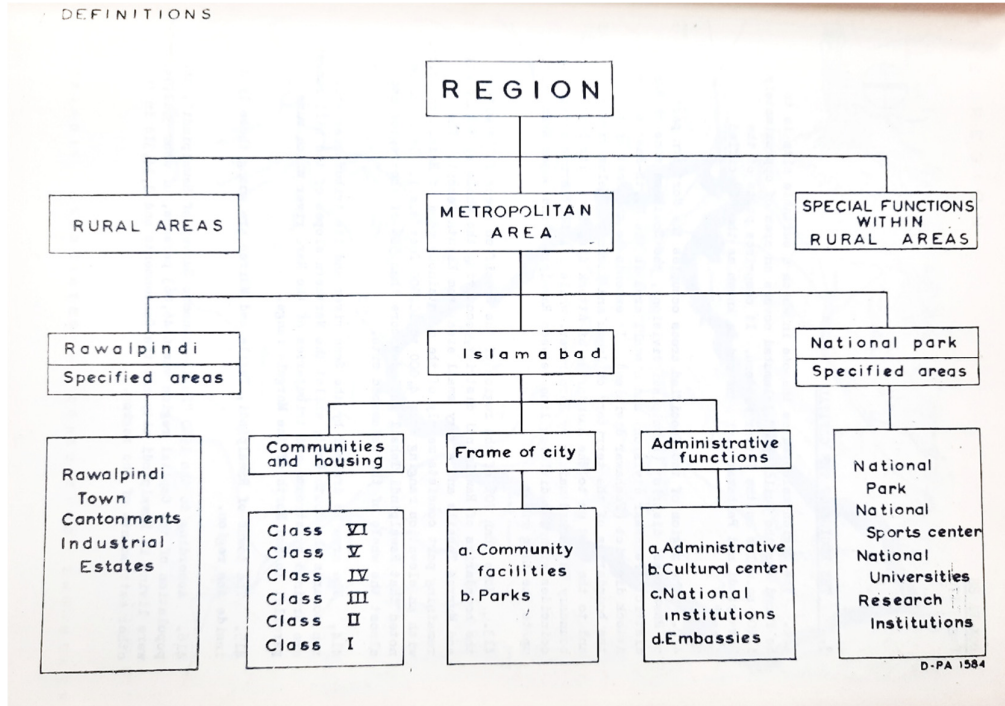
Figure 4.12. Definition of Zones and Sectors in Islamabad. Source: Islamabad Program and Plan, Vol:2, D-PA 1584

As discussed earlier in the chapter, Islamabad was to be developed as an independent settlement with the role of Rawalpindi being to provide services to the new city along with existing infrastructure so as to save maximum amount of costs and provide assistance in the functioning of Islamabad. However, moving forward, the focus of development only shifted to Islamabad Metropolitan Area and the National Park.

The National Park

According to the Doxiadis plan, National Park was located at the Junction of Islamabad and Rawalpindi. The park was designated for specific land use:

1. For educational and scientific institutes of national importance, such as national university, atomic energy center, research center, national health center, etc.
2. Recreational facilities, both active and passive, such as sports centers, exhibition areas, zoo, botanical gardens, etc
3. Agricultural areas for cultivating vegetables and fruits required for the two cities.

Moreover, the National Park was home to Rawal Lake, which was created in 1961 in order to collect water for irrigation and water supply to the Twin cities. These three main parts of the Metropolitan area were then subdivided into Sectors. Islamabad is divided into five zones; Zone I, Zone II , Zone III, Zone IV and Zone V (Figure:4.13).
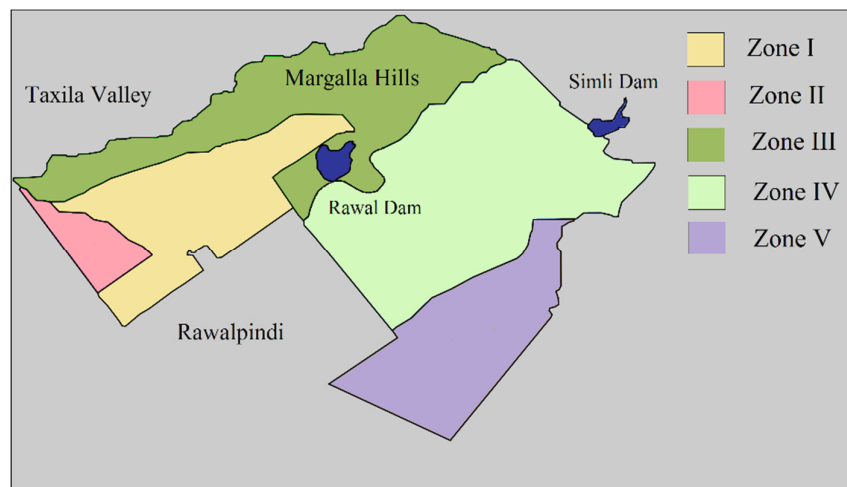
Figure 4.13. The five zones of Islamabad. Source: Wikimedia Commons

4.4.3 Distribution according to Land use

One of the defining features of Islamabad is the division according to Land use. The administrative sector has been placed towards the East of Islamabad, which spreads

towards the hills. From the administrative Sector, the Central Business District of Islamabad is developed in the form of a strip running South West. This axis defines the anticipated growth pattern for Islamabad; with the residential sectors growing along with the Civic Centre in a uni-directional growth pattern. Sector I, composed of Light Industrial Zone, follows the same trend as well. Above Sector I, is Sector H, designated for Universities, Schools and other Governmental Institutions. Sector E, F and G are primarily Residential Zones.
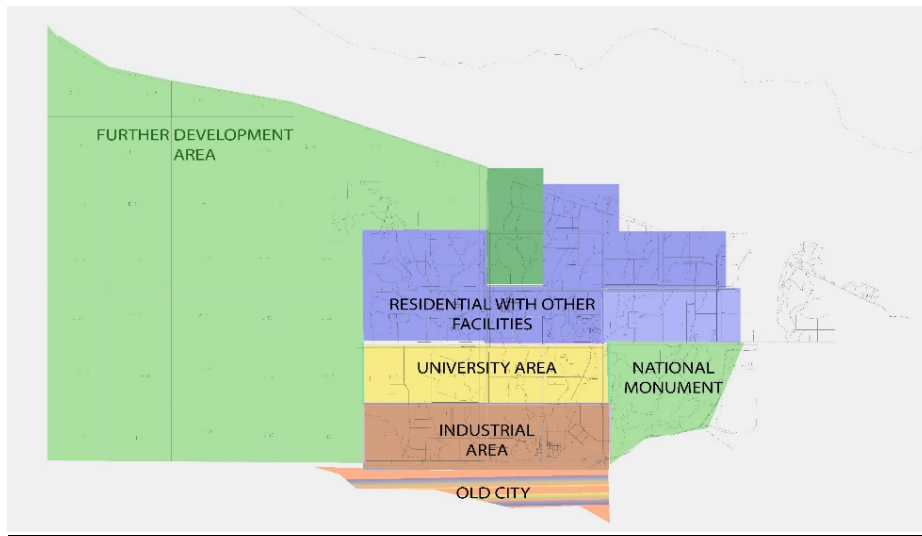
Figure 4.14. Zoning according to Land use in Islamabad. Source: Author

Administrative Zones:

The capital city always serves as the administrative center of a country. Similarly, in Doxiadis plan for Islamabad, two types of administrative functions were recognized:

1. Administrative functions serving the residents, which would house local administration such as civic, business and recreational centers
2. Administrative functions of the national interest including the Presidential Palace, Supreme Court, Parliament, Amphitheatre for National or international conferences, Mosque, Museum, official guest house, diplomatic enclave with embassy buildings and the residences of diplomatic cops. etc.

As zoning in Islamabad was done according to Land use, these two types of Administrative functions were also segregated with the National level administrative functions placed at the foot of Margalla hills, running longitudinally from North South. Similar to how the Road Network was used to define the Grid Plan of Islamabad, in the National Administrative Sector of Islamabad, a wide lane road not only ensured free movement of traffic but also provided a longitudinal orientation to the institutions of utmost National importance. This was also important in order to connect and form communication between various administration services. Along with this, it also sets a blue print for the pattern of growth for the city in future in accordance with those published by Doxiadis. The area for administrative land use was also allocated by pre-determining the number of civil servants, incomes of the inhabitants, expected traffic density, etc.
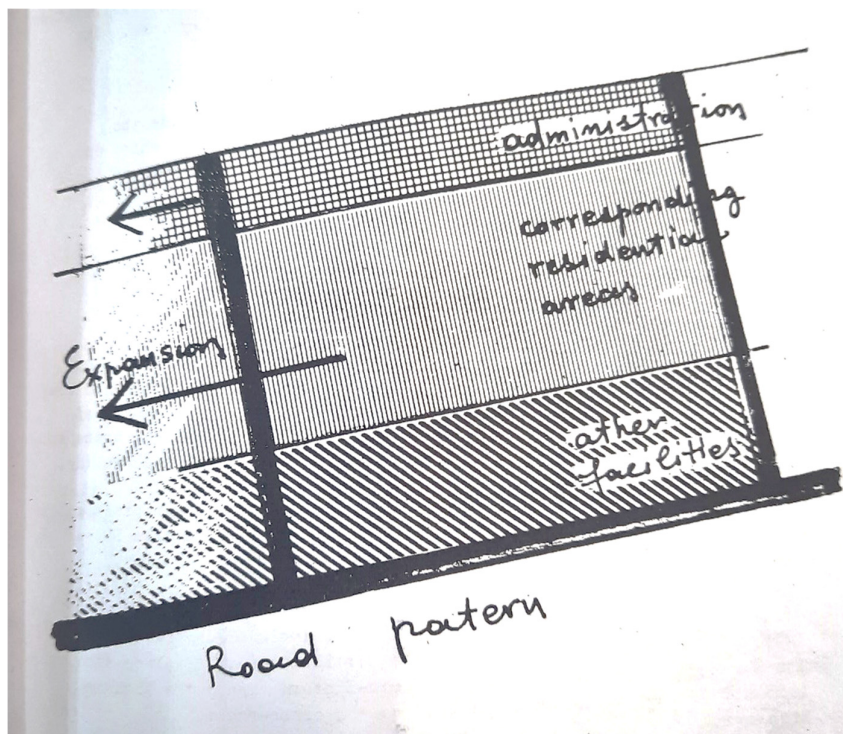
Figure 4.15. Direction of Growth of the administrative sector and its residential and other areas. Source: Islamabad Program and Plan, Vol:2, D-PA 1197

Administrative Sector for the Residents:

Finalized during the era of military dictator Ayub Khan, the Islamabad Masterplan featured a main axis in the form of Capital Avenue, running through the core of the city i.e. the central business district now known as Blue Area, culminating and framing the Presidential Palace at one end and defining the future expansion of the city from the other. Similar to other highways, the Capital Avenue defines the pattern of development along both its sides, forming a commercial avenue similar to corridor development. With the administrative sector of National interest on a higher level, this avenue was anticipated to become the most dominant part of the city.

This however did not happen as the central core became low in density and the city rather than expanding towards East West axis started growing towards South West. Over the years, with the development of Zone 5, business started to relocate on GT Road an in its proximity serving Zone 5 in order to benefit from the now evolving market.

Interrelation of functions in the administrative Centre

One of the main reasons for creating a new capital for Pakistan was to ensure the proper functioning of administrative functions. The core of the city right below Margalla hills provided the perfect setting for this purpose, which coincided with the main Axis of Capital Avenue and formed a culmination point. This translated Doxiaids's theory of Dynapolis, where the administrative and central sector of the city both commence at the core it the city and expand outwards. The administrative sector hence formed The Capitol complex, with all its functions lying at the heart of Islamabad. Similar to the orientation of the grid, the administrative sector will have to be developed following the direction of Margalla hills, so as to define a pattern for future growth.
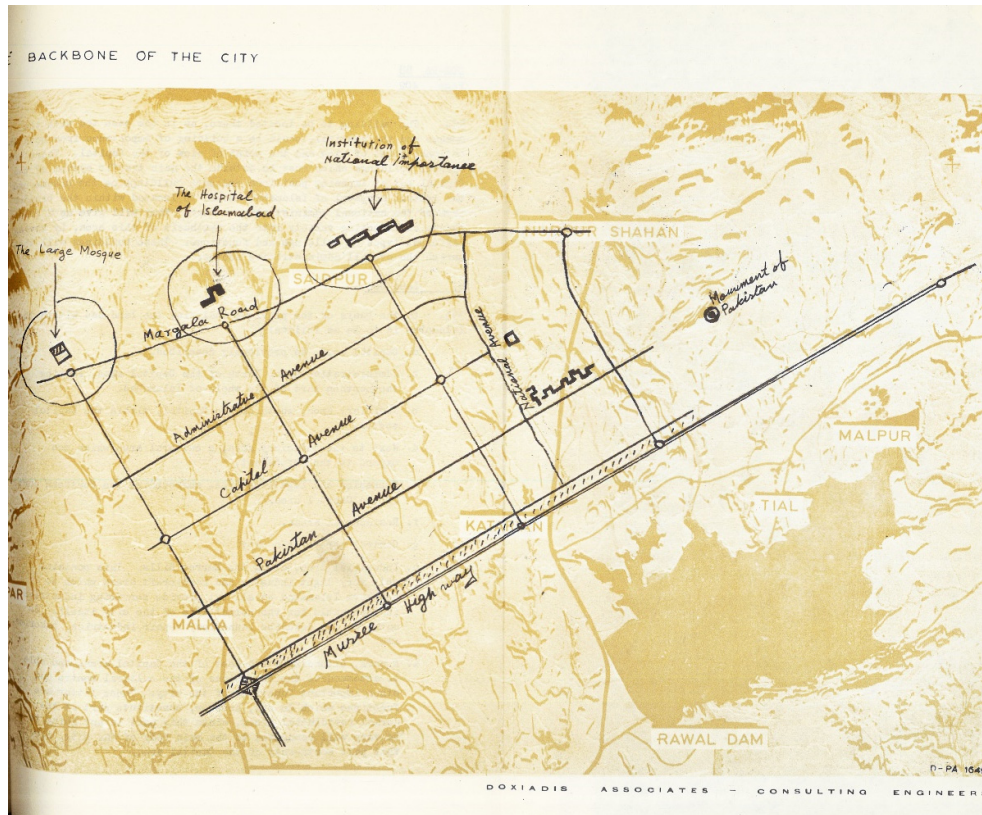
Figure 4.16. The Backbone of City. Source: Islamabad Program and Plan, Vol:2, D-PA-1649

4.4.4   Division into Sectors

Islamabad has been sub-divided into sectors known as Communities Class V. Each sector has an area of 2km x 2km, which had predicted to accommodate 20,000 to 40,000 people. Each sector has been designed according to the Income group it will serve. The sector serves as a basic module which repeats itself in the entire masterplan; each sector then sub-divided into 4 or 3 Sub-sectors named Community Class IV, with a Commercial Zone in the center known as "Markaz"; a civic center accommodating all types of shopping, business and civic activities. Each sub-sector also has a smaller "market" in the center. In this way, each Sector, with its 4 sub-sectors acts as a Self-Sufficient unit. The Sub-sector i.e. Community Class IV is

subdivided into Community Class III, which is further divided into Community Class II. This develops a blueprint for future expansion and development of other sectors in Islamabad.
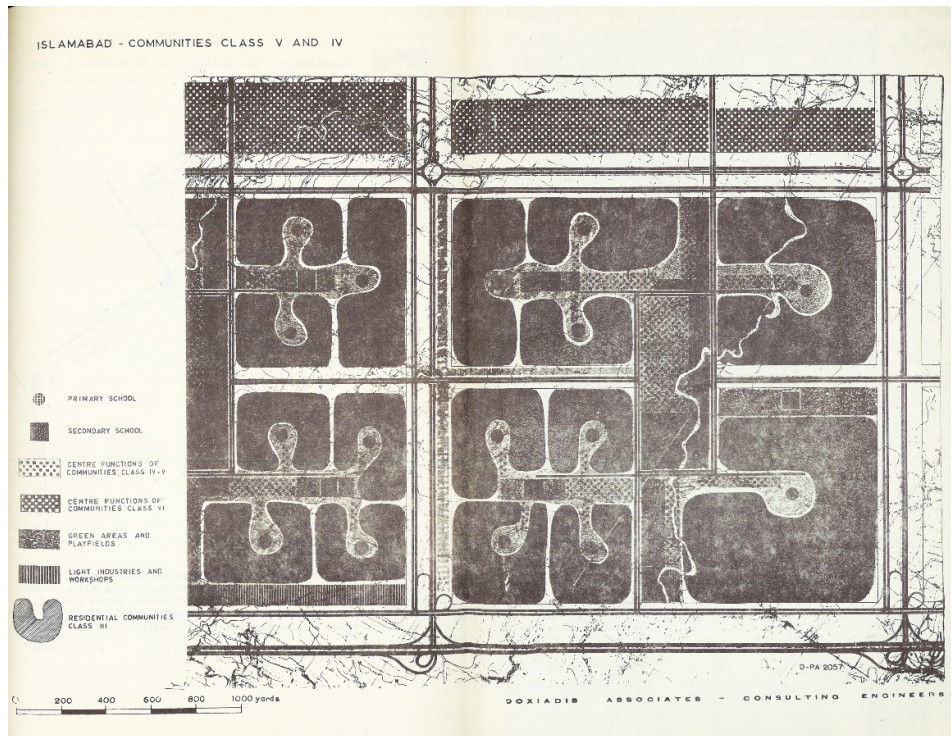
Figure 4.17. Islamabad Community Class V and IV. Source: Islamabad Program and Plan, Vol:2, D-PA-2057

Similar to how the grid plan of Islamabad was developed in accordance with 4 intersecting highways at right angles, each Sector also takes its shape from the pattern of principal roads placed 2,200 yards apart in both directions. This module serves as a basic unit for the Master Plan which can easily be replicated and helps in maintaining a unified scale. These principal roads then define the Hierarchy of Road Network within the sectors and direct the flow of traffic as well as the organization of various land uses within the Sector.

THE OLD CITY

here the modulus is the block
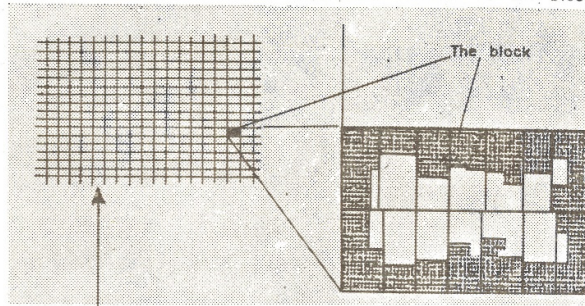
The block

THE NEW CITY IN THE SAME SCALE
now the modulus should be the sector
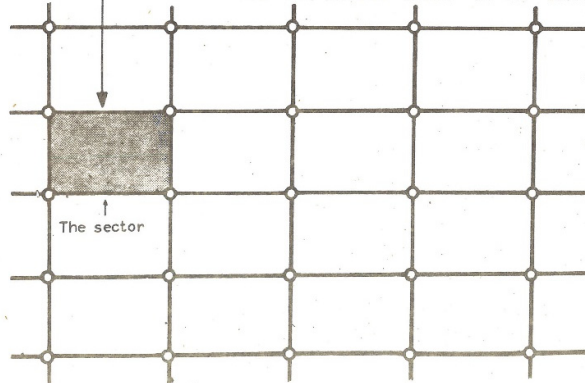
The sector

The scale in our city planning has changed. Thus the basic element which used
to be the city block is now replaced by the community sector.

D-GA 317

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Figure 4.18. The Sector and its Scale. Source: Islamabad Program and Plan, Vol:2, D-GA 317

In order to ensure that all the sectors are Self-Sufficient, adequate facilities have been provided, both in civic center of Community Class V and in the smaller markets of Community Class IV. In each sector, there is a provision for three to four secondary school for a Class IV community. Similarly, there are three to four primary schools per Class III community. Further, there is a kindergarten and children's playground in each Class II community. Similarly, in order to accommodate facilities such as recreation, sports, health, etc, adequate spaces have been provided for future expansion.

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Figure 4.19. Sectors in Islamabad. Source: Islamabad Program and Plan, Vol:2, D-PA-1627A

4.4.5   Hierarchy of Road Network

- **Highways dictate the masterplan of Islamabad; a modernist characteristic:**

The chief characteristic of the landscape is that it runs from north-east to south-west along valleys formed by a series of hills running in the same direction. The Murree Highway had to follow this direction through a valley formed by two hills: the Islamabad highway has been aligned vertically to the Murree Highway between the existing airport and Shakarparian hills. Two more highways, by-passing the existing town of Rawalpindi, have been proposed. On the basis of the above ideas, a system of four highways becomes the basic step for the metropolitan area. These axes form a big square, which will define all future transportation systems and all major functions within the metropolitan area (Figure: 4.20).
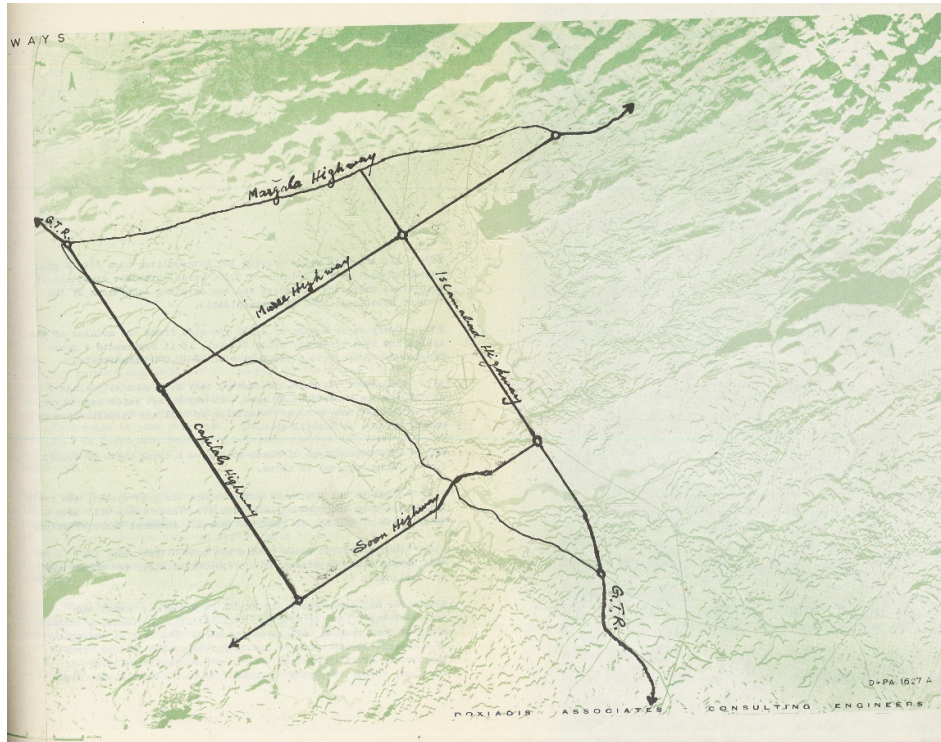
Figure 4.20. Main Road Networks defining Grid. Source: Islamabad Program and Plan, Vol:2, D-PA 1627 A

The grid pattern provides a layout for the hierarchical distribution of roads, which have the following Right of way (ROW): (Appendix G)

1. Expressway: 1200 ft ROW designed with the objective of serving high speed motor traffic
2. Main Avenues: 600 ft ROW
3. Tertiary Roads entering the sectors and surrounding residential communities: 150-200 ft ROW
4. Roads leading to individual houses and buildings, running into residential communities are Streets, which are primarily for vehicles and pedestrians: 30ft- 40ft ROW
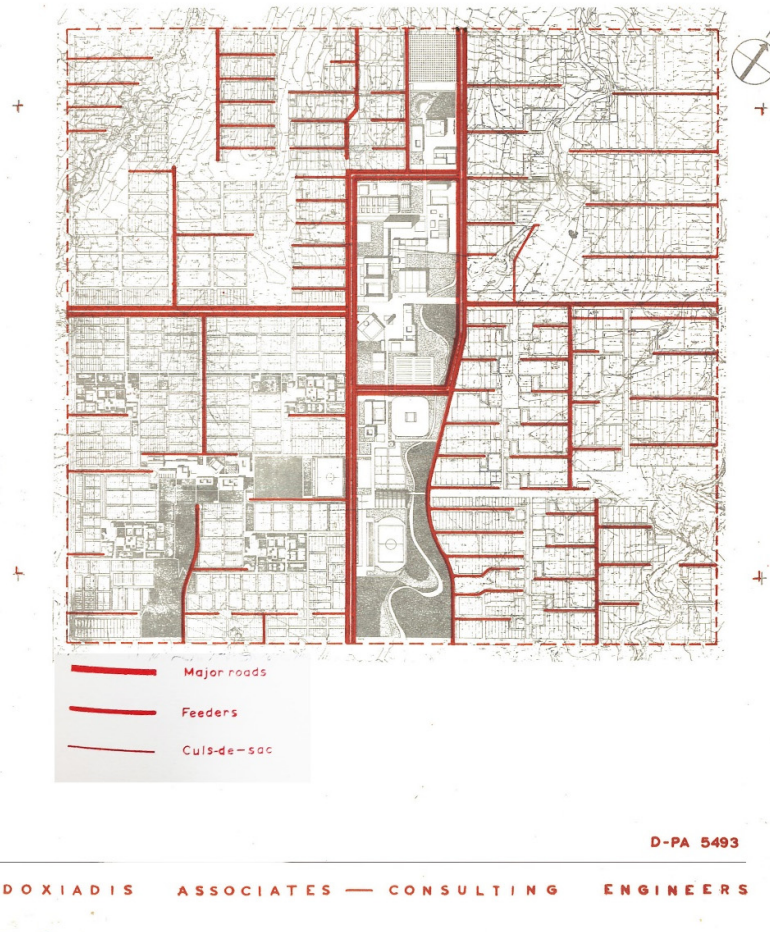
Figure 4.21. Road Classification. Source: Islamabad Traffic Width of Roads and ROW Program and Plan, D-PA 5491

The roads have been designed in a way which provide complete segregation to motorized and non-motorized traffic. Green belts are provided across avenues to buffer the high speed traffic from residential areas. Hence, the human scale and the machine are treated separately by providing elements that lead to their segregation.

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This methodology however lead to the preference of automobile over Non-motorized forms of transport. The collector roads were only provided inside the Sector and Sub-sector where as the arterial roads were primarily high speed. Where the idea was to make each Sector Self-sufficient, in reality, this was not achieved and residents had to travel outside their sectors for work, education and leisure purposes.

Road Construction

As part of the initial construction, Capital Avenue and Murree Highway was constructed, having a width of 2 lanes along with a 10 feet shoulder on either side, which was sufficient for the then population of Islamabad in 1960. Since 1959, the road construction was the responsibility of Capital Development Authority and no Mass Transit Authority or Federal Transport Authority was formed to undertake the tasks with regards to Traffic engineering and Road development. From the beginning, Islamabad's transport decisions were based on Predict and Provide approach, which led to the expansion of 2 lane Kashmir Highway to the now 6 Lane Srinagar Highway.
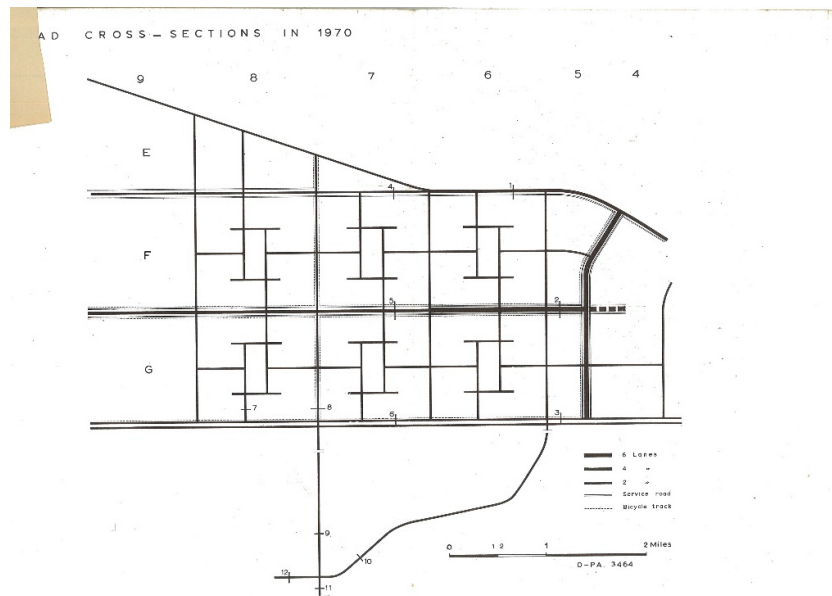
Figure 4.22. Road Cross Section in 1970. Source: Islamabad Traffic Width of Roads and ROW Program and Plan, D-PA 3464

4.4.6   Predetermined Growth Pattern; a Constant struggle between Top Down and Bottom Up Approach

Doxiadis imagined the growth of Islamabad in a uni-directional path, following the South West axis, unlike the settlements of the past, where human settlements used to grow in concentric circles, similar to waves in air or water. (Figure: 4.23a). This was due to the fact that earlier settlements were small, having a population of only a few hundred thousand people, with the rate of growth being slow. Today, human settlements grow at a higher speed into populations of millions and tens of millions of people, and follow several lines of networks (Figure: 4.23b). Inspired by this pattern, some scholars believe that settlements could be linear or star-like, to aid in such growth. (Figure: 4.23c and 4.23d). Doxiadis, however, did not imagine Islamabad to grow in this pattern.

Imagined as a dynamically growing settlement, Doxiadis believed that a linear pattern of growth for the Capital will put all pressures on the center, triggering it to collapse. As for the star like forms, they tend to increase the average distance between inhabitants of the settlements. Hence, Doxiadis predetermined the growth pattern for Islamabad; where the city's growth will be uni-directional, leading to a parabolic form, forming an ideal dynamic city or Dynapolis (Figure:4.23e) (Doxiadis, Islamabad. The Creation of a New Capital, 1965, p. 8).
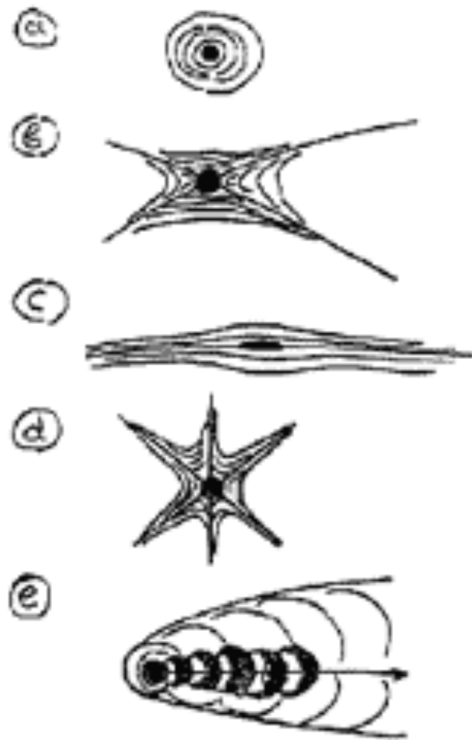
Figure 4.23. Formation patterns of the Human Settlements. Source: (Doxiadis, Islamabad. The Creation of a New Capital, 1965, p. 8)

In a similar way, the process of building Islamabad was divided into phases. By outlining who was required first, Doxiadis had proposed to build first for the builders, who will build the city. This decision paved the way for a not only predicting the phase wise development of the city, but also gave a complete creative control to Doxiadis and his team on the development. (Doxiadis, Islamabad. The Creation of a New Capital, 1965, p. 9) This decision paved the way for a predetermined land use in the Sectors and sub-sectors, overlapped with the Modernist idea of Zoning according to Function.

THE STRUCTURE OF DYNAPOLIS

City of Blocks

City of Sectors

City of Super Sectors

City of larger Super Sectors

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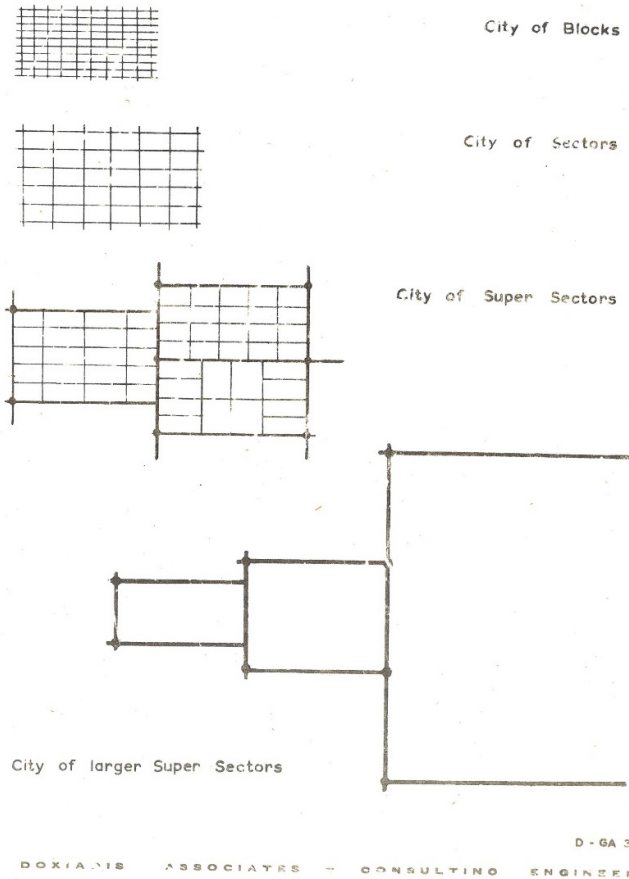
Figure 4.24. The Structure of Dynapolis. Source: Source: Islamabad Program and Plan, Vol:2, D-GA 329sector

The Master Plan of Islamabad was based on the utopia of Self-Sufficient City. Similar to other modernist cities, a pre-determined growth pattern was defined-a top down practice which led to the low-density in central core of the city. This was promoted by the adoption of a unity in scale; which was considered necessary to achieve a cohesion between the various elements of the town. (Doxiadis) In order to avoid the isolation of spaces and build character and common language of the city,

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a scale was defined for plots, streets, open spaces, squares, roads, etc. This was further superimposed by the rigid grid pattern, which gave a blueprint for the system of axes and orientation for future development.

For each sector, bye laws were not only defined for residential units, but also guidelines were given for volume, heights, densities, and floor indices of the buildings in each civic center and administrative area. This ensured that Islamabad will have a cohesive design language specifically in the administrative sector and the public buildings area. However, the guidelines were not followed in the years leading to the development of Blue Area, which marked a stark contrast between the Capitol Complex, Blue Area and the Sector centers of each sector i.e. Markaz.

4.5   PART II: The Modernist Plan of Islamabad and Automobile Dependency; the Macro Scale

4.5.1   The problem of urbanization: understanding the growth patterns

Study done on Islamabad by Butt et al., (2011) to understand metropolitan expansion, land use patterns over a period of three decades shows that urban development has expanded by 87.31 km^2 till 2009. Further, in the same study, images from multi sensor and multi temporal satellite data in a detailed assessment on the urban sprawl of Islamabad Metropolitan Area shows that there has been a loss of forest areas along with the urban growth (Butt et al., 2011). A comparison of their data with Masterplan of Islamabad from 1960, 1992 and 2010 shows that urbanization has occurred towards Zone IV and Zone V, which has led to the loss of land cover, vegetation and agricultural land.
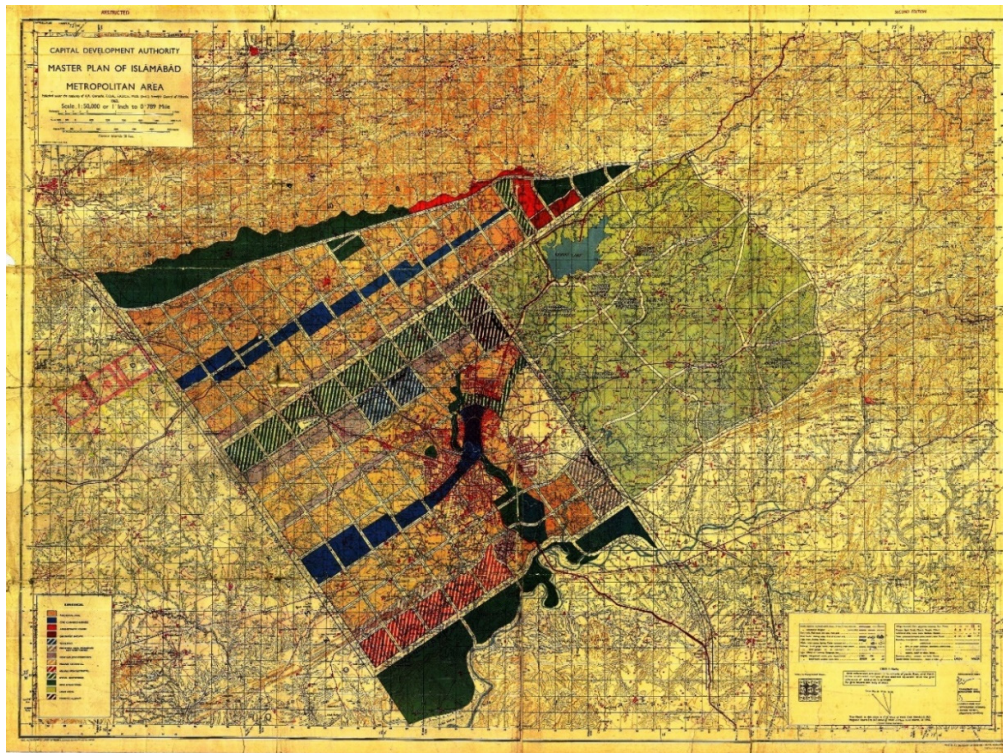
Figure 4.25. The Islamabad Masterplan by C.A. Doxiadis. 1960 Source: CDA Library, Iqbal Hall, G-7, Islamabad

The Initial masterplan of Islamabad did not mark Zone V, whereas the current Zone IV was allocated as the National Park having the following functions: (Appendix A)

1. Educational functions of national importance
2. Institutions of a National character
3. National Sports Centre.
4. National Park Functions
5. Zoo, botanical gardens
6. Exhibition Grounds

However in 1992, owing to the increasing population of Islamabad, CDA published new regulations which marked Zone V and allowed some additional functions in Zone IV.
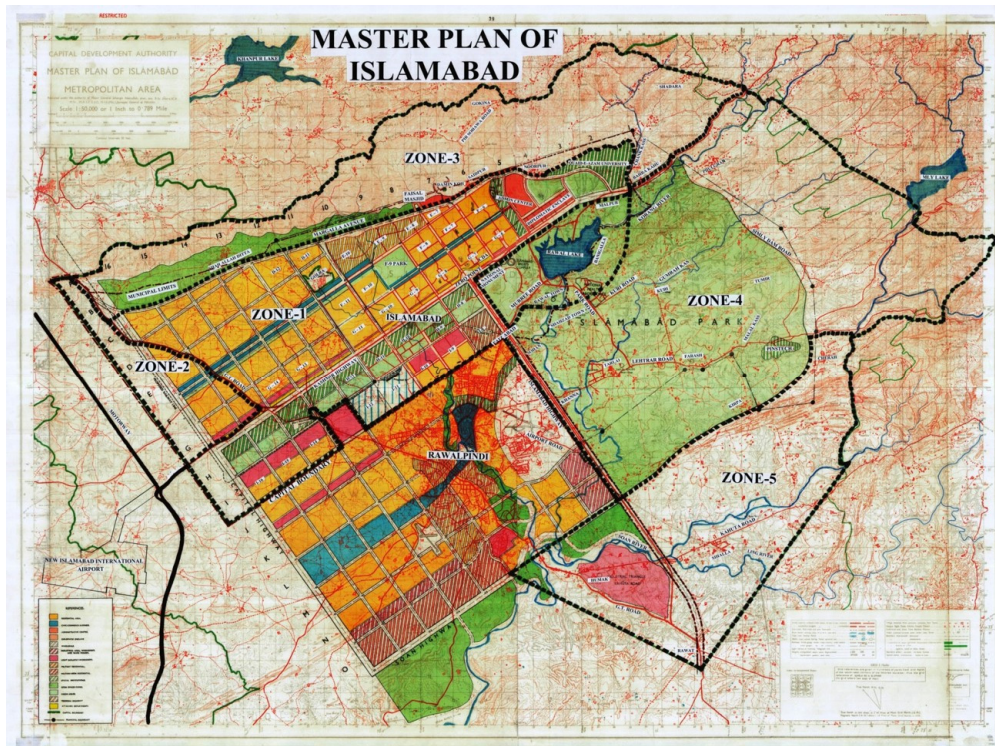
Figure 4.26. The Islamabad MasterPlan, Revision by CDA 1992. Source: CDA Library, Iqbal Hall, G-7, Islamabad

In 2010, CDA revised the construction regulation in Zone IV, and published a new Masterplan, while extending the boundaries of Islamabad Metropolitan Area. This led to the massive urbanization towards the South East side leading to urban sprawl and making the central core of the city low in density as seen in Figure 4.28.
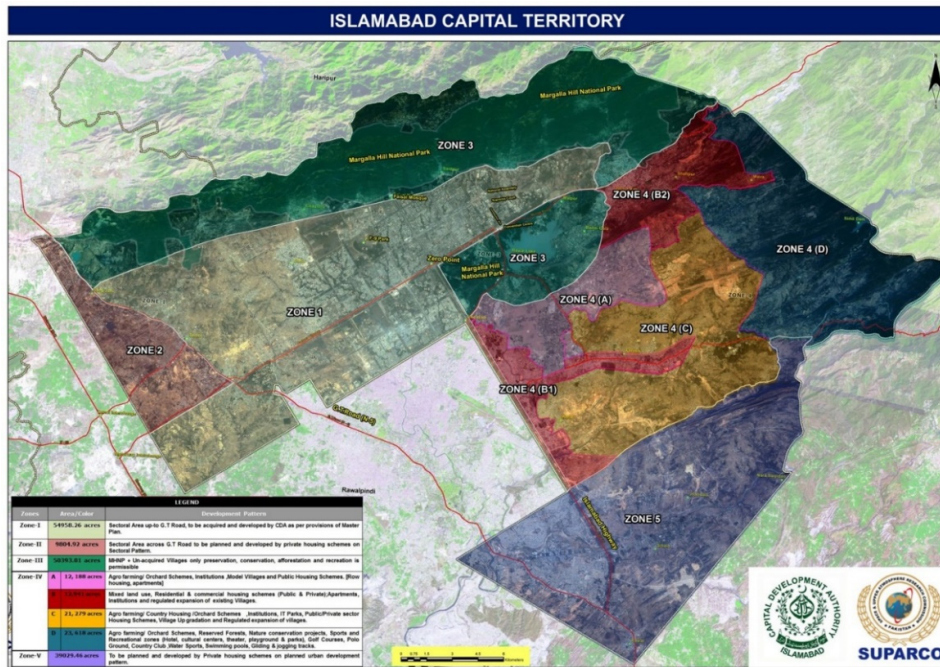
Figure 4.27. The Islamabad Master Plan, Revision by CDA 2010. Source: CDA Library, Iqbal Hall, G-7, Islamabad

In the Doxiadis masterplan, the urbanization was planned in Sectors ranging from A to I along with some isolated settlements. This was however revised in 1992 by CDA, where Zone V was introduced as are residential zone. Similarly, in 2010 regulations were changed for Zone IV, which was once dedicated for National Park and specific use. The city's population has also expanded in an exponential rate with the population being approximately 117,669 in 1961 which increased to 805,235 according to the 1998 census report and currently stands at 10, 95,000 according to the 2017 census. Due to the rapid increase in population, CDA introduced new sectors and allocated more Zones for residential development, eventually leading to a massive urban sprawl.

An analysis of the land use/ land cover map of Islamabad available from 1972 to 2009 shows the increase in population towards the South. It is interesting to note the Masterplan in 1992, which shows a sparse population in the central core of the city

i.e. Zone I. Despite this, CDA passed Zoning regulations in 1992, which marked Zone V as a residential area as well modifying and expanding the Land use of Zone IV. A look at maps from 1998 and 2000 show the results of these regulations; despite having a center that is not fully populated, the residents started to move towards the 2 new Zones i.e. Zone IV and Zone V, resulting in Urban Sprawl. As observed in the masterplan of 2009, Sectors towards the West in Zone I are empty while the Southern side of the masterplan i.e. Zone V has become densely populated.

Similarly, the area of bare land from 54.80km^2 in 1972 had reduced to 45.99km^2 in 2009 and has seen a downward trend. Dense forest and mixed vegetation has also seen a similar trend with the former reducing from 36.57km^2 in 1972 to 28.72km^2 in 2009 and the latter from 272km^2 in 1972 to 218.83km^2 in 2009. Against a 9.87 km^2 in 20 year period from 1972 to 1992, mixed vegetation has seen a reduction of a massive 43.3km^2 in in a 17 year period (See Table 4.1). This figure coincides with the change in zoning regulations of CDA in 1992, which added Zone 5 as a residential zone along with modifying the land use of Zone IV.

Figure 4.28. Urbanization in Islamabad as seen in 2023. Source: Google Maps

Likewise, sparse population area has seen an upward trend from the years 1972 to 2009, with a massive increase of 33.16km^2 in 17 year period following CDA's zonal regulations of 1992 as compared to the increase of 11.26km^2 in 20 year time period from 1972 to 1992. Thickly populated areas follow the same trend, with a total increase of 42.89 km^2 from 1972 to 2009.

Table 4.1 Table taken from the article Assessment of Urban Sprawl of Islamabad Metropolitan Area. Source: (Butt et al., 2011, p. 11)

Table 5 Results of classified images of eight classes include bare land, dense forest, mixed vegetation, shadowy regime, sparse residential areas, thickly populated areas and water bodies

Land cover features	1972 (km^2)	1979 (km^2)	1992 (km^2)	1998 (km^2)	2000 (km^2)	2009 (km^2)
Agriculture farms	332.14	328.02	300.07	327.01	323.90	313.80
Bare land	54.80	53.38	65.13	58.20	49.86	45.99
Dense forest	36.57	35.53	40.01	42.19	34.57	28.72
Mixed vegetation	272	265.01	262.13	238.70	232.63	218.83
Shadowy regime	32.87	33.02	32.45	32.84	33.56	33.13
Sparse residential area	79.07	84.12	90.33	91.32	110.28	123.49
Thickly populated area	85.93	95.10	103.13	105.20	107.56	128.82
Water bodies	12.33	11.52	12.43	10.25	13.36	12.92
Population data (millions)						
Population	0.237549	0.300152	0.520179	0.805235	0.86245	1.22
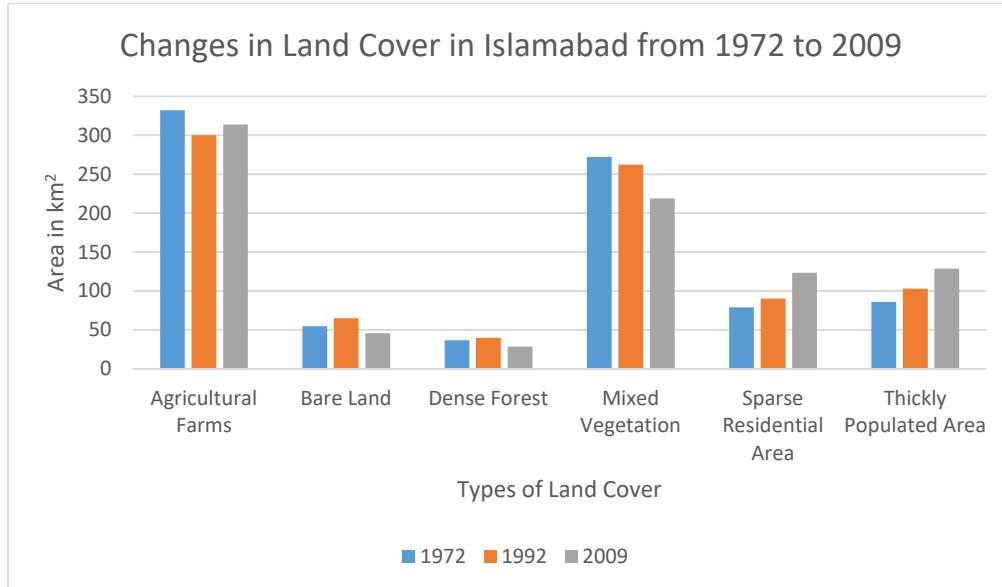
Figure 4.29. Chart developed by using the data from the article Assessment of Urban Sprawl of Islamabad Metropolitan Area Using Multi-Sensor and Multi-Temporal Satellite Data, (Butt et al., 2011)

An analysis of the satellite data shows that the Agricultural farm area has continuously reduced specifically in Zone I, Zone IV and Zone V. Where Zone I had been anticipated to grow and expand in the Doxiadis Plan, the reduction of agricultural farms in Zone IV and Zone V comes as a result of the urban sprawl that the city has faced specifically after the 1992 amendments in zoning by the CDA. Similarly, the mixed vegetation has reduced continuously in all the Zones of Islamabad. Satellite Data also shows an increase in the sparsely populated in Zone II, the location of which is the direction in which Doxiadis had anticipated the growth of Islamabad. However, the densely populated residential areas ae observed along Zone 5 of Islamabad, along the Islamabad Expressway. The Satellite images also show that bare land has reduced greatly over the 37 year period with urbanization increasing in all Zones of the city except for Zone III (See Figure 4.30).

Overlapping these results with the population density and car ownership data shows that suburban sprawl has led to Islamabad core become low in density, leading to increased distances between different functions of the city. With the lack of adequate Public Transport, an increased use of private car is observed leading to Automobile dependency in the city. It can be observed in the Satellite imagery, that bare land and natural vegetation has been replaced by impervious surfaces such as Roads which coincides with the Road development plans of CDA. The expansion of Islamabad Expressway and the construction of 7th Avenue in 2006 and 9th Avenue in 2008 verifies these images.

Land Use / Land Cover Classification of Study Area
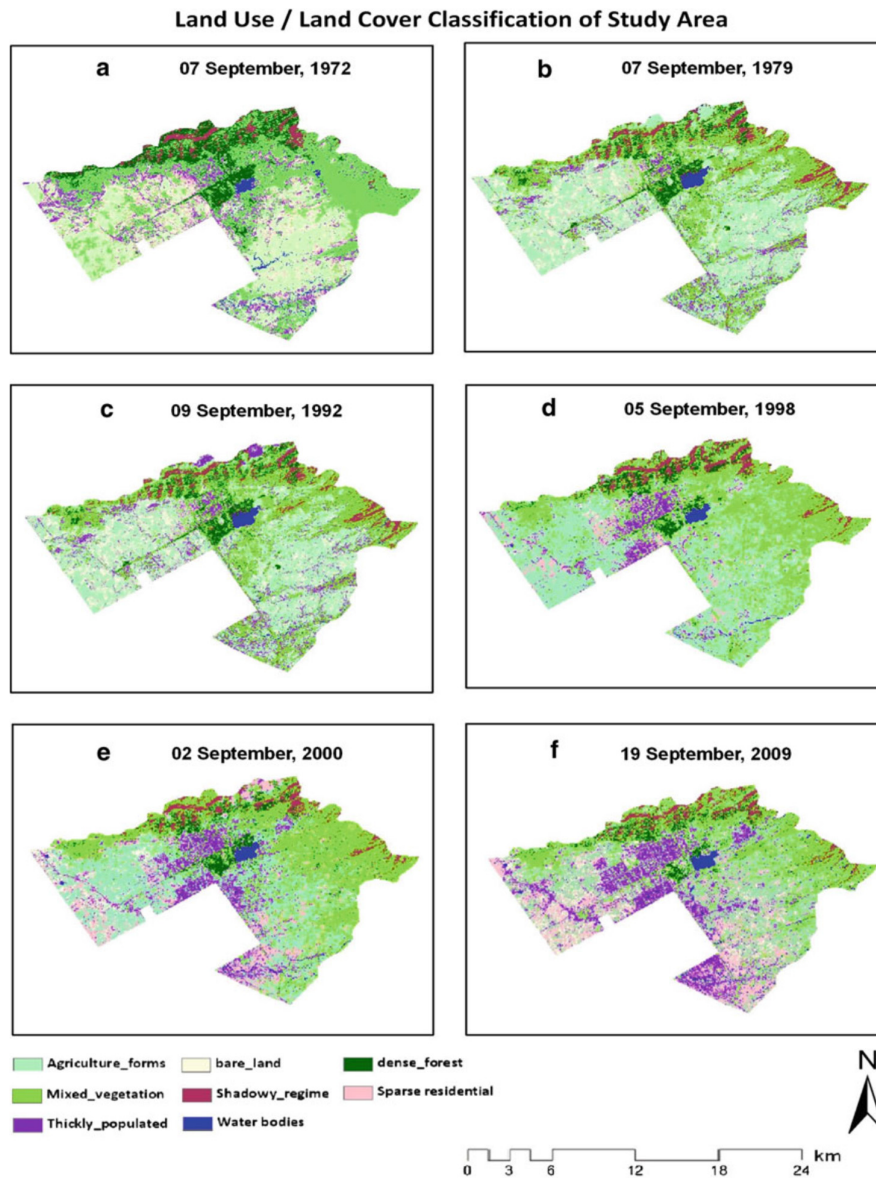
Figure 4.30. Satellite Data shows Land Use/ Land Cover changes in Islamabad from 1972-2009. Source: (Butt et al., 2011, p. 9)

4.5.2   Planning according to Social Class

Another modernist feature of Islamabad is that it has been zoned and segregated according to income groups of residents. Since the city was to accommodate

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Government servants of different grades, it was expected that incomes levels will vary greatly. It was anticipated that intermixing of different income groups would create social problems as well issues in planning. This led to a sociological study, which provided guidelines on the gradual integration of lower-income groups.

Each Sector of 2km x 2km known as Sector is further sub-divided into Four Sub-sectors called Class IV Community. According to the guidelines provided by sociological study for the integration of different income groups, each Community Class IV provides housing for no more than four, and preferably only three income groups (Doxiadis, Islamabad. The Creation of a New Capital, 1965). Similar to Low-income housing in other modernist cities, it was proposed that Civil Servants should be separated with the other residents of the city. However, the sociological study along with the failure of such housing projects around the world overturned this proposal. Civil Servants were designated the Sector G along with providing Government Housing. In this way, the civil servants were neither cut off from the rest of the population nor fully merged between the other income groups. To date, Sector G-6 and G-7 is occupied by Government servants with their subsequent second and third generations, which were built in the 1960s.

- **Plot sizes according to Income Groups**

The plotting in Islamabad has been done on income basis, with lower income groups having smaller plots and the higher income groups having bigger plots. The plots have been segregated according to Sectors, where D, E and F have the biggest plots. On average, Islamabad plots vary from 111 sq. yards to about 3,000 sq. yards, according to income groups and in the sector in which they are located. The plots are mostly designed in rectangular form, with the frontage dimensions of plots being than their depth. Taking the cue from grid iron plan, majority of the plots have a regular shape with special efforts being made to ensure that there are very few irregular plots, especially in the low-income areas.

Table 4.2 Population Density in different zones of Islamabad Source: CDA and PBS

No.	Zone	Number of Plots	Area (km2)	Avg. No of Residents	Persons per Hectare	Dwellings per hectare
1.	Zone I	CDA: 83912 Private: 2887	222.4081	508,643	22.869	3.9
2.	Zone II	Private: 36291	39.6791	212,665	53.596	9.14
3.	Zone IV	CDA: 7395 Private: 6439	282.5287	81,067	2.86	0.489
4.	Zone V	CDA: 6589 Private: 21925	157.9466	167,092	10.579	1.80

- **Low-density Planning:**

Various planning decisions converted Islamabad into a Low-density city. Apart from the plot sizes, the idea to provide Privacy within a residential unit was given utmost importance. According to reports published as an explanation to Master Plan, individual houses were given preference over residential apartments as they do not offer privacy especially near the civic centers. This however led to extremely low-density in the center, specifically near the commercial area i.e. Markaz, which could have provided a mixed used development. Similar problem is observed in Sector G-6 and G-7, where Government Housing was built as a single family unit.

Modernist cities by separation of Zones according to functions led to lower densities. This was primarily due to the increasing car ownership and the development of Freeways, which led to the development of Suburbs. The segregation of Work, Leisure and Living created such pattern of trips that made the provision of Public transport and use of Non-Motorized forms of transport inefficient. Scholarship suggests that Lower average densities eventually leads to a decline in NMT and increase the trip lengths due to reduced catchment area for Public Transport.

Islamabad is divided into five Zones namely, Zone I, Zone II, Zone III, Zone IV and Zone V. Zone III is primarily the reserve area whereas the other 4 ones are being used for all types of Land Use. Zone I forms the main Islamabad Metropolitan Area whereas as Zone IV and Zone V form the Outer Area. An analysis of data obtained from Capital Development Authority and Pakistan Bureau of Statistics shows that, Zone I, despite being the oldest developed Zone and the central Metropolitan Area is low in density with 22.869 persons per Hectare and 3.9 Dwellings per Hectare.

Zone IV and Zone V, the suburban Zones proposed by CDA in 1992 Revision of Masterplan, only have a density of 2.86 and 10.579 persons per Hectare. The extremely low-density in Zone IV can be justified as it was earlier conceived as an Agricultural Zone in 1960. In the revision proposed by CDA in 1992, the area was assigned for only special forms of Land Use including Agro farming, agriculture, institutions, etc.

The chart shows a density of 53.596 persons per hectare for Zone II. This is an anomaly since the area is currently composed of informal settlements, known as "Katchi Abadi". Similarly, the Dwelling per hectare of 9.14 are the plots that are allotted in Zone II and yet to be properly acquired by the CDA.

The Inner Metropolitan Area of Zone I shows the lowest density. According to the data obtained from PBS and CDA, Sectors D, E and F in Zone I have 1.76dwellings/ hectare. Sector G and H has 2.8dwellings/hectare. The sector with the highest density in Zone I is Sector I, having 9.43dwellings per hectare.

Table 4.3 Table shows the Residential Density in Zone I of Islamabad. Source: Table developed from data provided by CDA.

No.	Section	Area Sqk m	Residenti al Houses	Apartments/ Flats	Total	Dwelling per Hectare
1.	BCS-I: Sector D, E, F	54	7871	1633	9504	1.76
2.	BCS-II: Sector G, H	56	13374	2337	15711	2.8055
3.	BCS-III: Sector I	20	18013	848	18861	9.43
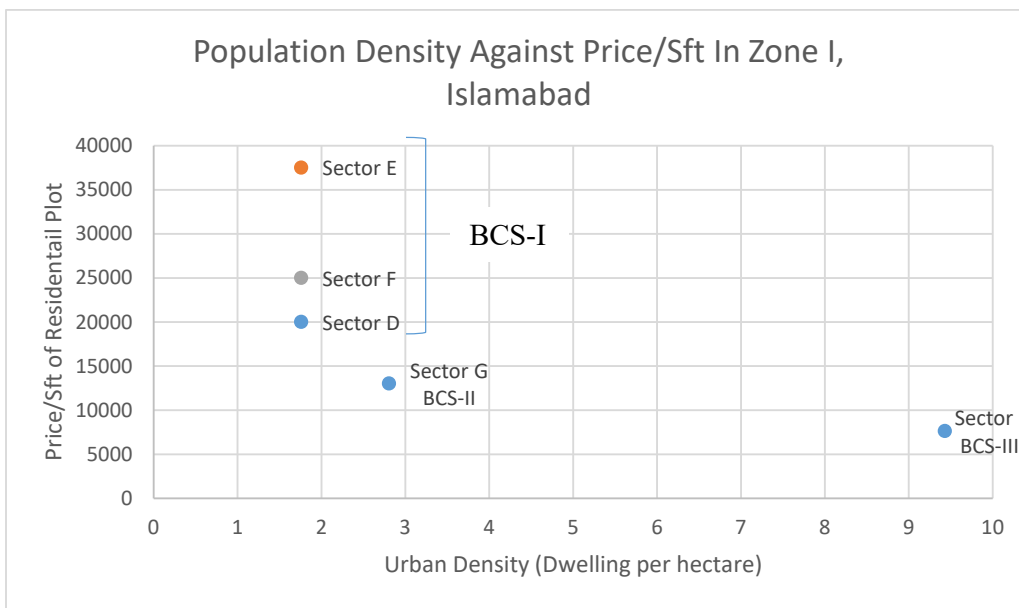
Figure 4.31. Chart shows the relationship between Low-density and price/sft of Residential Plot in different Sectors of Zone I, Islamabad. Source: Chart developed from data provided by Zameen.com and CDA

This figure overlaps with the socio economic division of the city as well. Sector D, E and F host the highest income groups of the Capital, Sector G and H middle class

income group whereas Sector I hosts lower middle class income groups. In Islamabad, the highest income groups have the lowest density and the lowest income group the highest.

Hence, the general trend in Islamabad shows extremely low-density in the center as well as the outer suburban area. A comparison with Automobile dependent cities in US shows a similar number. In US, the Metropolitan Area population density is 14 persons/ hectare on average with the Inner Area having 45 and the outer area having 11 persons/hectare. In Australia, the average Metropolitan area population density is 14 with the Inner Area being 24 and outer area with 13 persons/hectare. In comparison, Islamabad's numbers fall between 10 and 23 persons per hectare, which are even lower than highly automobile dependent cities in US and Australia. Wealthy Asian and Compact European cities have a far higher number with former's average Metropolitan area population density reaching 160 persons per hectare, Inner and Outer area population density being 464 and 115 persons/hectare whereas in compact European cities, this number reaches 54 persons/hectare in Average, Inner and outer being 91 and 43 persons/hectare respectively (See Table: 4.4).

Table 4.4 Table shows the comparison of cities in terms of Car Use and Public Transport. Source: Peter Newman and Jeffrey Kenworthy)

REDUCING AUTOMOBILE DEPENDENCE

Table 1: Comparing Cities in Terms of Use of Cars and Public Transport (all statistics for 1980)

	Wealthy Asian cities	European cities	Australian cities	US cities
Cars per 1000 people	88	328	453	533
Gasoline use per person	5,493	13,820	29,829	58,541
Car vehicle kms per person	1,067	3,485	5,794	8,715
The share of public transit in total passenger kilometres (%)	64	25	8	4
Public transport vehicle kilometres of service per person	103	79	56	30
Proportion of workers walking or cycling(%)	25	21	5	5
Metropolitan population density (persons/hectare)	160	54	14	14
Inner area population density (persons/hectare)	464	91	24	45
Outer area population density (persons/hectare)	115	43	13	11

SOURCE: Sustainable Urban Transport Systems Project, ISTP. The Asian cities were Tokyo, Singapore and Hong Kong.

In order to understand the relationship between Low-density areas and automobile dependency, these figures of population density can be overlapped with the average kms travelled per person annually.
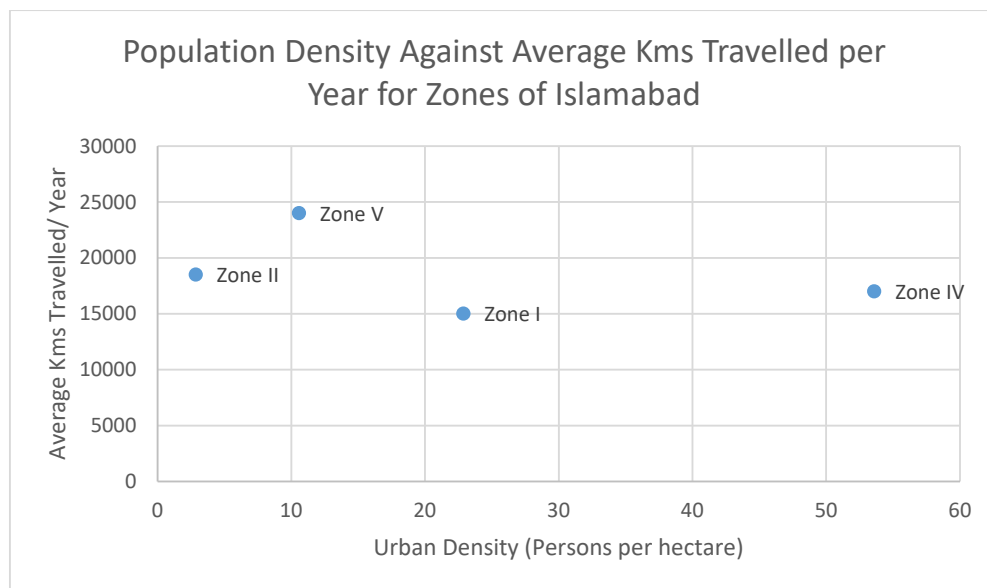
Figure 4.32. Chart shows relationship between increasing density with average kms travelled per year in different zones of Islamabad. Source: Chart developed through data obtained from CDA, PBS and ITP. (Appendix B)

In Islamabad, Zone I being the oldest developed Zone has the highest population density with 22persons/hectare and the lowest average kms travelled per person annually; 15,000km/year respectively. This number rises to 24,000km/year for residents of Zone V, which has a population density slightly above 10persons/hectare. A similar relationship has been drawn by Peter Newman and Jeffery Kenworthy in which the Car Dependent cities of US and Australia show a higher fuel consumption/year while having the lowest densities in comparison to the compact cities of Europe and Asia. Higher the fuel consumption, lower the density and vice versa (See Figure:4.33).

Figure 1: Population Density Against Gasoline Consumption per Person for 32 Cities (data for 1980)

SOURCE: Newman, Peter W.G and Jeffrey R. Kenworthy, *Cities and Automobile Dependence: an International Sourcebook*, Gower Technical, Aldershot, 1989, 388 pages.
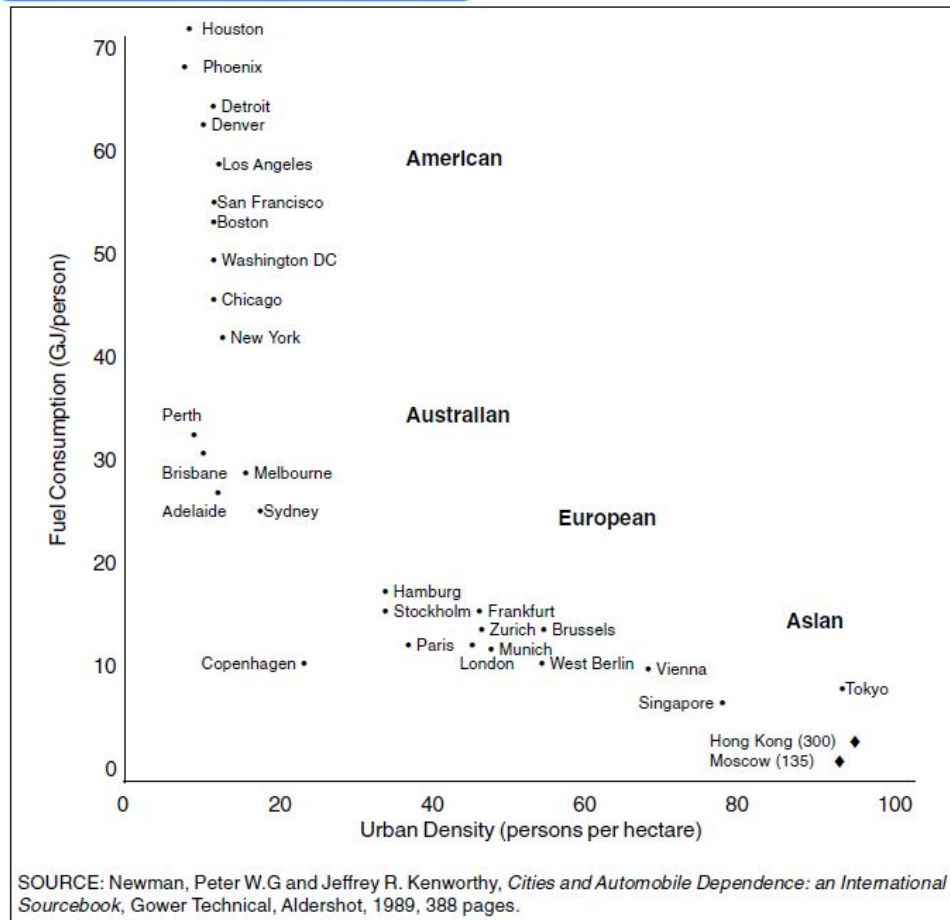
Figure 4.33. Chart shows relationship between Population Density against Gasoline Consumption per Person for 32 cities. Source: Peter Newman and Jeffrey Kenworthy

4.5.3   Mapping the Transport Network; missing Layer of Public Transport

- **Islamabad BRT System**

The only public transport system that runs between the capital cities is The Rawalpindi-Islamabad Metrobus, a 22.5 km bus rapid transit system that operates between Pakistan Secretariat, in Islamabad, and Saddar in Rawalpindi. (Figure:4.34) The second stage which stretches 25.6km between the Peshawar Morr Interchange and New Islamabad International Airport is currently under construction (APP, Metro Bus Extension: NHA assures timely completion, 2017) (Figure:4.35). The metro bus does not cater to the area in discussion i.e. Zone 5
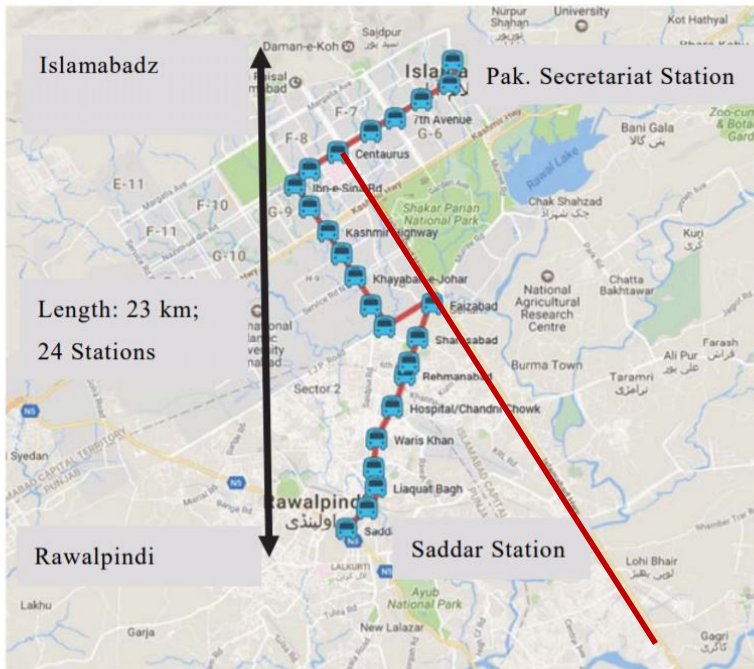
Figure 1. Route of RI BRT corridor and 24 stations

Figure 4.34. First Phase of Rawalpindi-Islamabad BRT. The red line shows Islamabad Expressway which does not benefit from the Metro Bus. Source: Google Maps
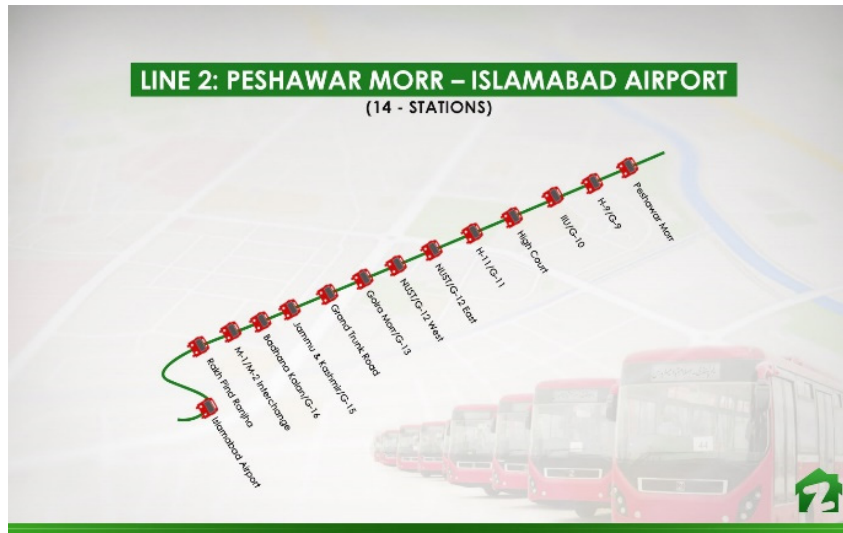
Figure 4.35. Second Phase of Rawalpindi-Islamabad BRT. Source: Zameen.com

The metro service is yet to cover the entire city, so reaching some areas of Islamabad using the Metro bus is not possible. Even with the current route, it is difficult to reach the metro stations in the absence of feeder buses or a shuttle services.

Automobile Dependency; Increasing Vehicle Ownership

Islamabad has seen a drastic increase in Vehicle Ownership in the past ten years. Despite the increase in the cost of cars and fuel alike, vehicle ownership has not seen a decline. According to data available with the Excise and Taxation Office, Islamabad, between 2012 and 2022, 998,710 vehicles have been registered in the Federal Capital. Out of this number, 502,025 motor cars have been registered. With the rising use of Online Taxi Service like Careem, Uber and Indriver, motor cab registration only amounts to 72 during this time period. The Private Wagon association's strong hold in the Federal Capital is proven by number as 28,117 new Pickup vehicles, 49,761 Vans and 1,101 Wagons have been registered during the 10 year period.

Table 4.5 Vehicles registered in Islamabad from 2012-2022 Source: ETO

No.	Body Type	Count
	Registered Vehicles between 2012-2022	
1.	Ambulance	318
2.	Bus	429
3.	Coaster	75
4.	Crane	3
5.	Fork lifter	7
6.	Jeep	67,013
7.	Mini Bus	121
8.	Mini Truck	299
9.	Mixer	3
10.	Motor Cab	72
11.	Motor Car	5,02,025
12.	Motor Cycle	3,48,382
13.	Motor Cycle/ Scooter	12
14.	Oil Tanker/ Dumper	1
15.	Pickup	28,117
16.	Tanker	16
17.	Tractor	224
18.	Truck	462
19.	Truck/ Dumper/ Trailer	269
20.	Van	49,761
21.	Wagon	1,101
22.	Total	9,98,710

The numbers have shown have a big increase in car ownership from the data available from 2017 and 2019 respectively. In 2016, the number of registered

vehicles in Islamabad was just over the figure of 0.7 million[24]. In 2019, the number increased to 9, 79,398[25] whereas in 2022, this number has reached to 1,279,011, showing an increase of 23% (See Figure 4.36). From registering 200 vehicles per day in 2016, ETO reports to have dealt with 230 cases every day in 2019. Out of the 3, 48,382 total registered motor bikes from 2012 to 2022, 70,320 have only be registered in the last 3 years. years.
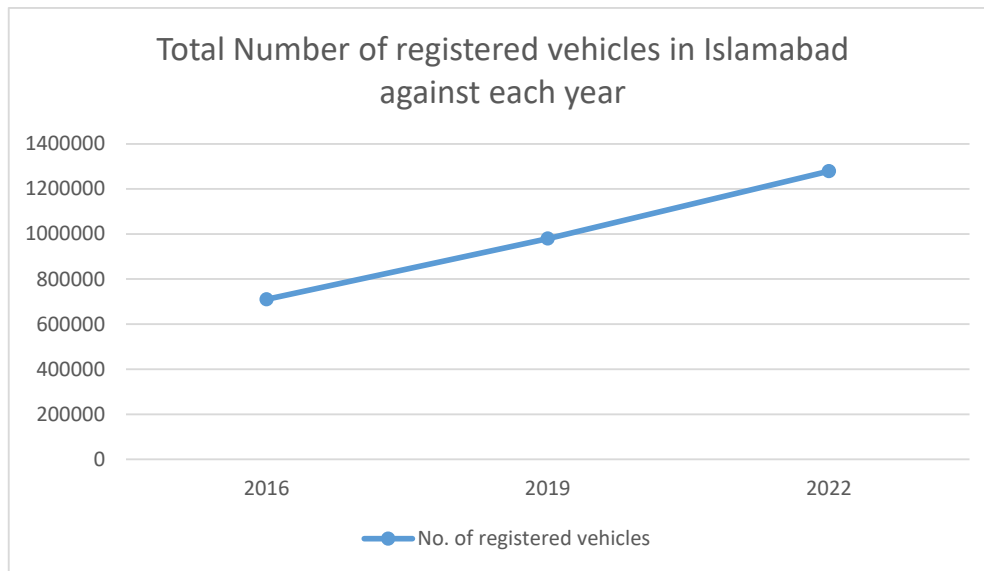
Figure 4.36. Chart shows the total number of vehicles registered in Islamabad annually in 2016, 2019 and 2022. Source: Chart developed from data collected from ETO, Islamabad

From an average of 3500 vehicles being registered in 2019 monthly, the number reached to 7800 in 2022. Comparing the private car ownership, with 36,500 private cars being registered in 2016, the number rose to 50,202 in the year 2022. Similarly,

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[24] (Chaudry, 2016)
[25] (APP, Registered vehicles in ICT cross over 979, 398, 2019)

out of the 50862 Private wagon/van registered between 2012 and 2022, 1825 were registered in 2016 whereas the number increased to 3500 in 2022 (See Figure:4.37). According to a survey conducted by ETO in 2016, every day, an average of 90 to 100 private cars and 4 to 5 commercial vehicles (Private Van/wagon) are being added to Islamabad's traffic.
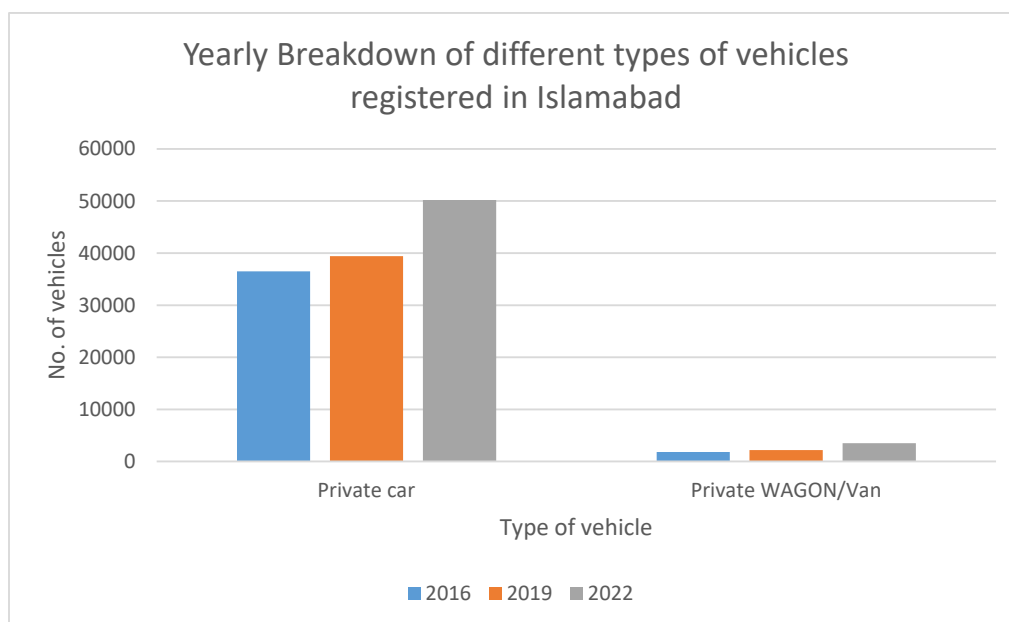
Figure 4.37. Chart shows the number of different types of vehicles registered in the years 2016, 2019 and 2022. Source: Chart developed from data collected from ETO, Islamabad

In order to discourage the purchase of new cars, ETO has increased the number plate registration fee which ranges between PKR100,000 to PKR300,000/= respectively. According to Director, Excise and Taxation, Islamabad, Bilal Azam, *"Different schemes and packages offered by the private banks had caused significant increase in number of vehicles in the city during past years."* (APP, Registered vehicles in ICT cross over 979, 398, 2019).

As of December, 2021, Islamabad had 12, 79,011 registered vehicles out of which 642,830 are private cars against a population of 10, 95,000. This totals up to 587 cars

120

per 1000 persons, which slightly falls below the average number 604 recorded in US cities and is higher than the average number of 491 in Australian cities. In Canada, the average number of cars per 1000 persons is 524, in Europe 392, in wealthy Asian cities 123 and in developing Asian cities 102 (Kenworthy & Laube, 1999). During the same time in Islamabad, the minimum private passenger vehicle kilometers per capita is 15,000 for residents of Zone I while it rises up to 24,000 for residents of Zone V. A comparison to cities in US shows that Islamabad's car ownership falls in the category of Automobile dependent cities.
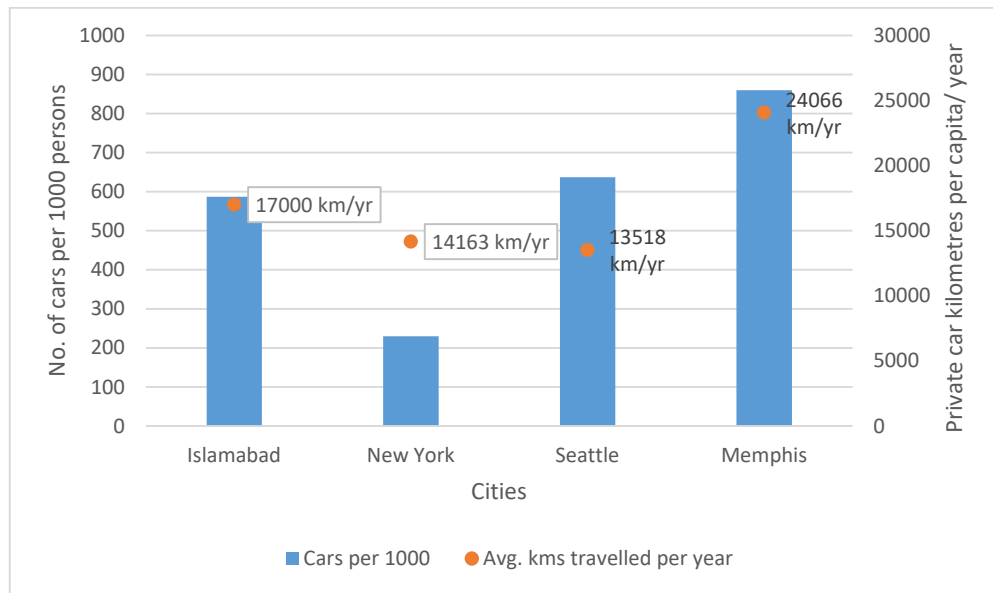
Figure 4.38. Chart shows the comparison between different cities around the world in relation to number of cars/1000 persons and Annual kms/ capita per year. Source: Chart developed from data obtained from ETO, ITP and research by Peter Newman and Jeffery Kenworthy.

Overlapping this data with Pakistan Bureau of Statistics, Islamabad has on an average 1.93 cars per household. This number almost equals Memphis[26], which has

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2 cars per household whereas New York[27] has 0.63 cars per household and Seattle[28] 1.1 car per household.

Table 4.6 Table shows the vehicle ownership and wealth in cities around the world. Source: Peter Newman and Jeffrey Kenworthy

Table 2
Vehicle ownership, use and wealth in cities, 1990

Cities	Total vehicles per 1000 persons	Cars per 1000 persons	Total vehicle kilometres per capita	Private passenger vehicle kilometres per capita	Gross Regional Product per capita (US$1990)
American	*751*	*604*	*12,336*	*11,155*	*26,822*
Minimum	New York 557	New York 483	New York 9181	New York 8317	Phoenix 20,555
Maximum	Denver 1037	Portland 763	Sacramento 15,194	Sacramento 13,178	Washington 35,882
Standard deviation	119	87	1772	1470	4383
Australian	*595*	*491*	*8034*	*6571*	*19,761*
Minimum	Sydney 530	Sydney 448	Sydney 7051	Sydney 5885	Perth 17,697
Maximum	Perth 678	Adelaide 537	Perth 8861	Perth 7203	Sydney 21,520
Standard deviation	58	39	591	434	1594
Canadian	*598*	*524*	*7761*	*6551*	*22,572*
Minimum	Montreal 455	Winnipeg 412	Toronto 6051	Montreal 4746	Not collected
Maximum	Toronto 706	Calgary 630	Calgary 9201	Vancouver 8361	Not collected
Standard deviation	104	85	1257	1387	Not available
European	*452*	*392*	*5026*	*4519*	*31,721*
Minimum	Copenhagen 341	Copenhagen 283	Paris 4100	Paris 3459	London 22,215
Maximum	Frankfurt 526	Frankfurt 478	Frankfurt 6636	Frankfurt 5893	Zurich 44,845
Standard deviation	63	62	767	707	6036
Wealthy Asian	*217*	*123*	*2950*	*1487*	*21,331*
Minimum	Hong Kong 78	Hong Kong 43	Hong Kong 1459	Hong Kong 493	Singapore 12,939
Maximum	Tokyo 374	Tokyo 225	Tokyo 3795	Tokyo 2103	Tokyo 36,953
Standard deviation	149	93	1295	869	13,542
Developing Asian	*227*	*102*	*2337*	*1848*	*2642*
Minimum	Manila 86	Surabaya 40	Manila 901	Manila 732	Surabaya 726
Maximum	Kuala Lumpur 403	Bangkok 199	Kuala Lumpur 4944	Kuala Lumpur 4032	Seoul 5942
Standard deviation	125	65	1488	1263	1975

Vehicle ownership and use display the strong ascendency of the automobile in US cities compared to other cities around the world; US cities are 70% higher in car use than their nearest rivals, the Australian and Canadian cities, 2.5 times higher than the wealthier European cities and 7.5 times higher than the wealthy Asian cities. However, this gap between US cities and other cities in their automobile dependence is not as strongly expressed in the actual ownership of vehicles, as it is in their use. Table 4.6 shows in each case that US cities exceed total vehicle and car ownership rates by much lesser margins than they do use. For example, US cities have 1.5 times

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[27] (Hallman, 2022)
[28] (Balk, 2021)

more cars per capita than in urban Europe and nearly five times more than wealthy Asian cities, but car use differences are much higher.

Automobile vs NMT; Speed Limits and Infrastructure

The grid iron masterplan of Islamabad takes its starting point from two highways; the Islamabad Highway and Murree Highway. These two are then overlapped at right angles by Soan Highway and Capital Highway; forming a square and setting the guideline for the Grid Masterplan. Doxiadis had anticipated that these four highways will define future transportation systems and all major functions within Islamabad.

The Highway and Road Network in Islamabad is maintained by Capital Development Authority's Engineering Wing under the Ministry of Transportation . Currently, the Road network is spread over 2,000 kilometers (1,200 mi), organized into various classifications which crisscrosses the Islamabad Capital Territory. The Islamabad Traffic Police maintains and updates the speed limits of these Roadways according to their location. The major two classifications of Islamabad Roadways are:

1. Territorial Highways: Highways and Expressways
2. Territorial Roads: Avenues, streets and lanes

While Doxiadis had proposed a network of 4 highways connecting Islamabad and Rawalpindi, only two of these highways have been realized till date in the form of Srinagar Highway, listed as Murree Highway in the Doxiadis plan, and Islamabad Highway, known as Islamabad Expressway. In addition, a total of 16 Territorial Roads along with these highways make up the Islamabad Road formation.

The Islamabad Traffic Police maintains and updates the speed limits of these Roadways according to their location. The speed limits range from 80km/h to 30km/h for LTV whereas the range for HTV/PSV is from 65km/h to 25km/h. The following table gives a list of speed limits on the roads.

Table 4.7 Data Collected from Islamabad Traffic Police. (Appendix C)

Sr. No.	Road Highways	Speed Limit for LTV (km/h)	Speed Limit for HTV (km/h)	No. Of Lanes
1.	Kashmir Highway	80	65	3-5
2.	Islamabad Highway	80	65	6-10
3.	Murree Road	80	65	4
4.	Constitution Avenue	70	65	4
5.	Jinnah Avenue	70	65	4
6.	Faisal Avenue	70	65	4
7.	Khayab-e-Iqbal	70	65	4
8.	Park Road	70	65	4
9.	7th Avenue	70	65	4
10.	9th Avenue	70	65	4
11.	Lethrar Road	40	40	2
12.	Kahuta Road	60	60	2
13.	IJ Principal Road	60 (Faizabad to Nasirabad)	60	3
14.	Major Roads	50	50	
15.	Service Roads	Dualized: 60 Single: 40	40	
16.	Street and Sectoral Road	30	25	
17.	Roads/Streets near Schools/Hospitals	30	25	

Studies have developed a relationship between higher speed limits with greater automobile dependency primarily by understanding the quality of alternatives provided in these zones. The roads which have higher speed limits are accessed on the basis of convenience to other modes of transport, the presence of infrastructure

to accommodate walking and cycling as well as the presence of quality public transit. In case of Islamabad, Sri Nagar Highway, Islamabad Expressway and Murree Road fall in the category of having a speed limit of 80km/h. As observed through Ped Shed Analysis, these roads lack infrastructure for NMT and are signal free zones.

According to a report published in 2013, the Islamabad Expressway in Islamabad, Pakistan faced an average of 48 accidents in one year due to pedestrians crossing the high speed highway. The presence of pedestrian bridges after an interval of every 1.1km does not help as they do not have ramps and the stair riser goes as up as 1' (Azeem, 2013).

Out of the 107 Fatal and 94 Non-Fatal Accidents[29] reported in Islamabad during the year 2012-2013, Islamabad Expressway reported 24 fatal and 23 non-fatal accidents whereas Kashmir Highway reported 18 and 22 respectively (Azeem, 2013). Both of these highways have a speed limit of 80km/h making them vulnerable to accidents. According to Islamabad Traffic police, the majority of the fatalities on these roads are either due to the collision of vehicles owing to high speeds or because of the pedestrians coming underneath the wheels because of the lack of infrastructure for pedestrians. Due to the widely gaped pedestrian bridges, the people on foot prefer to cross these highways rather than climbing the ill made pedestrian bridges.

The ITP, through its data in 2013, had advised CDA and the Capital administration to construct eight pedestrian bridges on Expressway, namely at Koral, Gnagal, Fazayia Colony, Zia Masjid, Kuri Road, Iqbal Town, Dhoke Kala Khan and Sohan. Of these eight, five were built by 2013 whereas 3 are yet to be built at Fazaiya Colony, Gangal and Koral. The Capital Development Authority owed the delay in installation of pedestrian bridge owing to the high cost of PKR 20 million to PKR 25 million (Azeem, 2013). In order to achieve a solution to this issue, the CDA had installed iron fences on the medians of Islamabad Expressway however this move

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[29] Data collected from Pakistan Bureau of Statistics. See Appendix D

did not succeed as pedestrians either jump over the fences to cross the highway or have cut the fences at some points to reach their destination easily.

In order to reduce the accidents on these highways, ITP and CDA have introduced fines which also indicate the preference of automobile over Non-Motorized Transport and Public Transit by the administration.

In April 2009, the ITP recommended a fine of PKR 50/-= on pedestrians found walking or crossing highways carelessly. The imposition came out alone, without analyzing the reasons as to why pedestrians put their lives at risk for crossing the high speed highway. However, a former Senior Superintendent of ITP recommended CDA to improve and increase the number of pedestrian bridges on Islamabad Expressway and Kashmir Highway. He understands that the bridges are not built on International standards and built without ramps, having 30-35 stairs with the risers reaching up to 1' in most of them, making it impossible for children, elderly, women and other people to climb them. These recommendations have come with an increased fine of PKR 2000/= for pedestrians crossing the Highways but are yet to be realized by the CDA along with the provision of International standard infrastructure for Non-Motorized Transport.

In contrast, 9th Avenue, 7th Avenue and Murree Road also fall in the same speed limit range, with the former two only 10km/h lower and the latter having the same speed of 80km/h, but are less vulnerable to accidents. This is because Kashmir Highway and Islamabad Expressway lack a proper Public Transport system and pedestrian have to cross road in order to reach the available local transport. However, these roads have a higher ratio of car to car or car to bike collisions due to increased speed limits. According to ITP, higher number of Lanes along with a greater speed limit turns these roads into race tracks by evening (Azeem, 2013).

Scholarship suggests that Roadways in automobile dependent cities are designed to maximize Traffic speeds and volumes i.e. high number of lanes (VTPI, Automobile Dependency, 2019). This holds true for Islamabad Expressway, Kashmir Highway and Murree Road, all having a speed limit of 80km/h and having increasing number

of lanes to accommodate large volumes of traffic. While Islamabad Expressway has lanes varying from six to ten, Kashmir Highway varies from three to five lanes whereas Murree Road has 4 lanes.

This brings to light how Evaluation practices in Islamabad tend to favor automobile dependency. As literature suggests, Transportation service quality that is measured in terms of vehicular traffic e.g. congestion delays, traffic speeds etc., with lesser importance to Non-motorized Transport favors automobile dependency (VTPI, Automobile Dependency, 2019). Such is the case in Islamabad as well. In order to improve the Traffic congestion in the city, Kashmir highway was widened from 2 lanes to five lanes in 2013 but no facility was provided to the pedestrians to cross the high speed road. Islamabad Expressway met a similar fate as well. In 2007, the highway was widened from three to five lanes from Faizabad to Koral Chowk and renamed as Islamabad Expressway, however no facility was provided to the pedestrians on this route. The preference of CDA was to allocate the budget for road infrastructure to the expansion and widening of lanes rather than on investing in Pedestrian bridges (Azeem, 2013). Non-motorized transport has been undervalued in these development projects by not only providing adequate number of bridges on Islamabad Expressway and Kashmir Highway, but also making the existing pedestrian bridges accessible to all by installing them on international standards.

Figure 4.39. Pedestrian bridges on Islamabad Expressway. Source: Author

Similarly, despite the Islamabad BRT running throughout the length of Murree Road, there is an absence of connecting shuttles for the users to commute for "The Last Mile". An absence of feeder buses makes accessibility to the BRT stations difficult. Similarly, there is little to no access for pedestrians to reach the BRT stations. There is a visible lack of Footpaths, zebra crossings, pedestrian signals around the BRT stations. Islamabad Traffic Police had initiated the idea of Battery powered Scooties for BRT stations in 2020. However, due to the lack of funding and interest by CDA, the project could not be realized.

Figure 4.40. Fencing and lack of pavement around BRT station area. Source: Author

Constraining Automobile dependency does not mean that funds should not be allocated for road infrastructure, it argues that increasing traffic capacity and speed limits on basic road systems leads to higher costs and unsustainable conditions for environment. Alternatively, these funds could be used to provide better infrastructure for Non-motorized forms of Transport as well as more accessible land use planning. According to Litman,, transportation policies can not only reduce the cost of driving but also reduce sprawl by better land use accessibility and by increasing options of other modes of transport. (Litman T. , The Costs of Automobile Dependency and the Benefits of Balanced Transportation, 2002).

According to Literature, most common indicators of automobile dependency in a transportation system are high capacity roads i.e. greater number of lanes to curtail congestion, abundant parking areas which encourages the use of car, maximizing speed limits, which in turn leads to an increase in total personal mobility. Increased speed limits create the impression that longer distances can be travelled in a shorter time (VTPI, Automobile Dependency, 2019). Zone 5 Islamabad faces the same issue. Located 28kms away from Zero point Islamabad, the zone is connected through Islamabad Expressway, having a speed limit of 80km/h, with signal free access and

having lanes ranging from 6 to 8. The Transport policy of Islamabad follows the model of "Predict" and "Provide'. Whenever a congestion is observed on a Road, the solution is presumed to be the addition of another lane. This has led to an increase in lane of all roadways every year. Similarly, in order to cater to the problem of urban sprawl, connecting highways have maximized speed limits to reduce the travel time. This does not, however, work as expected. More lanes lead to more traffic and higher speeds lead to more car fatalities.

It is interesting to note that higher density areas with narrow streets have more traffic congestion. But, in automobile dependent cities, since the citizens are dependent on car, the only viable solution imagined is to increase the speed limits along with the provision of extra lanes. , This in turn leads to an increase per capita congestion delay since residents drive more vehicle miles (STPP 2001; Litman 2004).

Car-Crash Data

Islamabad has seen a rising trend in car crashes over the last 10 years. Despite increasing the number of lanes on the main highways, fatal crashes have increased over a period of ten years. According to the data collected from PBS and ITP, from having 201 accidents in 2012-2013 time period, the number has increased to 238 in 2018-2019 cycle. 2020 and 2021 however saw a slight dip, primarily because of COVID-19 lockdowns with numbers reaching 189 and 172 respectively. 2022, however, the numbers have again shown an upward trend, with accidents reaching 193 till November, 2022. (See Appendix D)
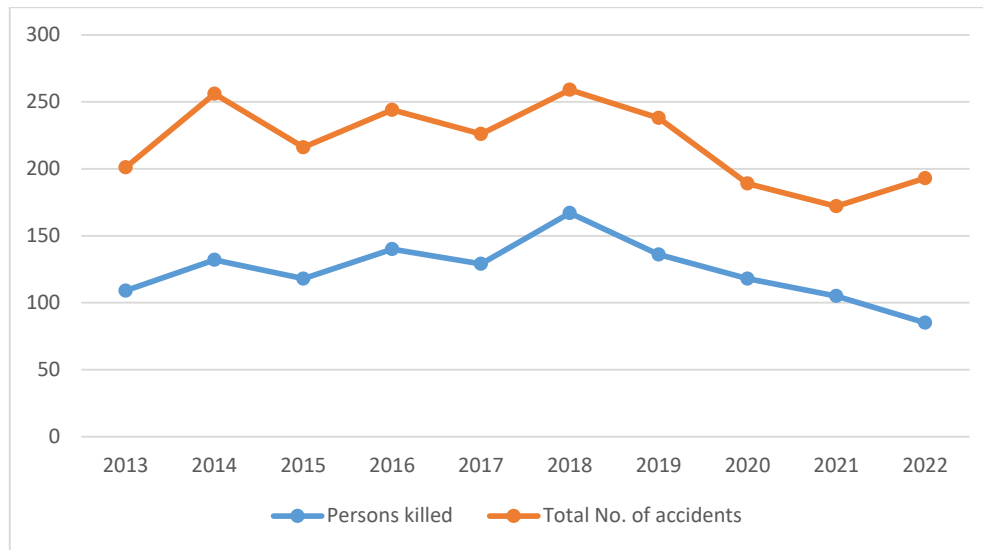
Figure 4.41. Chart shows the Total number of accidents recorded in Islamabad along with the fatalities reported from 2013 to 2022. (Data obtained from ITP and PBS, See Appendix D)

Islamabad Metropolitan Area had a population of 1,095,000 in 2019. Data collected from Islamabad Traffic Police and Pakistan Bureau of Statistics during the time period of 2018-2019 and 2019-2020 shows that Islamabad had 118 and 136 fatalities respectively in traffic accidents. The average of this time period approximately makes up a fatality rate of 11.59 per 100,000 pax, making it slightly higher than that in United States, which has the worst traffic safety performance of all developed countries with a traffic fatality rate of 11.7 per 100,00 (U.S. Department of Transportation's Fatality Analysis Reporting System (FARS), 2020). This number in Islamabad is more than triple as compared to UK, the Netherlands, and Sweden, all countries having cities that are least automobile dependent.

In order to understand the relationship between increased car usages to rising fatalities in accidents, Islamabad's numbers can be compared to other car dependent and less car dependent cities. As per the data available with Islamabad Traffic Police, on an average, a resident of Zone 1 commuting within the Zone drives 15,000km/year (9320miles/year). This number increases to an average of

24,000km/year (14912miles/year) for those commuting between Zone 1 and Zone 4 or Zone 5 and to 18,500km/year from Zone 5 to Zone 4 or vice versa.
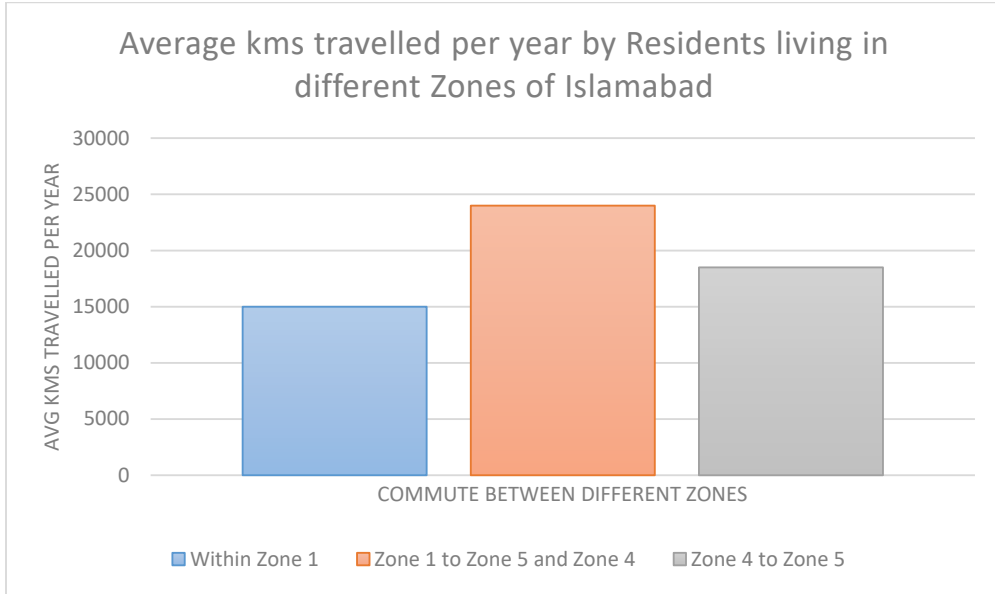
Figure 4.42. Chart shows the average kms traveled per year by residents living in different zones of Islamabad. (Data obtained from ITP)

Calculating the fatality rate in traffic accidents per 100,000 with the help of population and number of fatalities data available with Pakistan Bureau of Statistics for Islamabad Metropolitan Area, in the past 10 years, the highest recorded fatality rate in Islamabad has been 15.73 per 100,000 pax in 2018 and the lowest in 2021[30] with 9.02 fatalities per 100,000 pax.

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[30] Lowest Recorded Fatality rate as shown in Table 1 is 7.095 in 2022, but the last data recorded was till 31st October, 2022
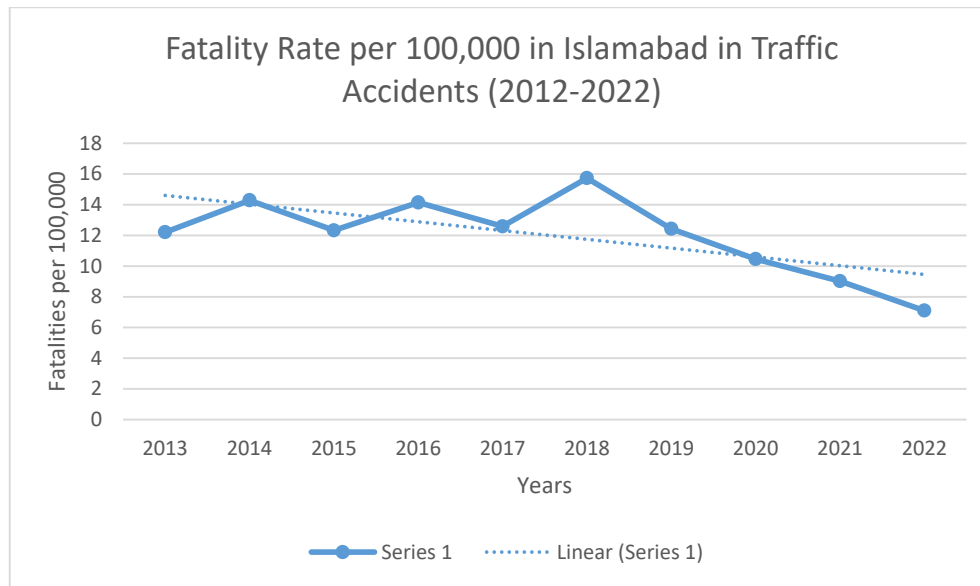
Figure 4.43. Annual Fatalities per 100,000 in Islamabad from 2013-2022 (Source: Chart developed by using Data obtained from PBS and ITP)

The sudden dip from 2019 onwards can be attributed to COVID-19 pandemic, where 2020 saw a complete lockdown and 2021 a partial lockdown in the city. From 2020-2022, majority of the offices shifted to work from home module as well as the schools, which shifted to online mode of education. Despite this, the number recorded by 31st October, 2022 for the same year is still high at 7.095/100,000 as compared to other cities around the world.

For instance, UK as a whole recorded a fatality rate of 2.4 per 100,000, with 1608[31] reported deaths against a population of 67.33 million[32] in 2021. The average km per year during this time period for the UK citizens stands at 8530km/year (5300 miles/year).[33] The most and least car dependent cities have almost the same fatality rate per 100,000 with Milton Keynes having 1.11, Nottingham 1.20 and London 1.39

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[31] (Reported road casualities Great Britain, 2022)
[32] (Data Commons, 2022)
[33] (Vehicle mileage and occupancy, 2022)

(Ian Campbell, 2020). With this data, it can be argued that lower number of annual miles leads to lesser Deaths in Traffic Accidents.

Similarly, a comparison with the more automobile dependent cities in USA shows that Seattle recorded 8,400miles/ year, Memphis 14,954 and New York 8,801miles/year respectively (The Center Square, 2020). The fatality rates in car accidents stands at 5.2 for New York with 1046 fatalities in 2020, a whopping 15.3 for Memphis and for Seattle 5.85 (U.S. Department of Transportation's Fatality Analysis Reporting System (FARS), 2020). Seattle and New York, having similar annual miles traveled have almost the same Fatality Rate per 100,000 population.

Memphis, on the other hand, has a greater fatality rate in traffic accidents along with the higher number of annual miles traveled. Till 2020, the state of Mississippi recorded the highest rate of traffic deaths per 100,000 with the number reaching 25.4 (U.S. Department of Transportation's Fatality Analysis Reporting System (FARS), 2020). Memphis, located on the Mississippi river, has been listed as the most car dependent city with 14,954 miles per year and Seattle as the least dependent with 8,400 miles per year (Berry, 2022). A comparision between these figures shows that the cities that have higher miles travelled per year also have the highest fatality rate in traffic accidents per 100,000 (See Figure 4.44).
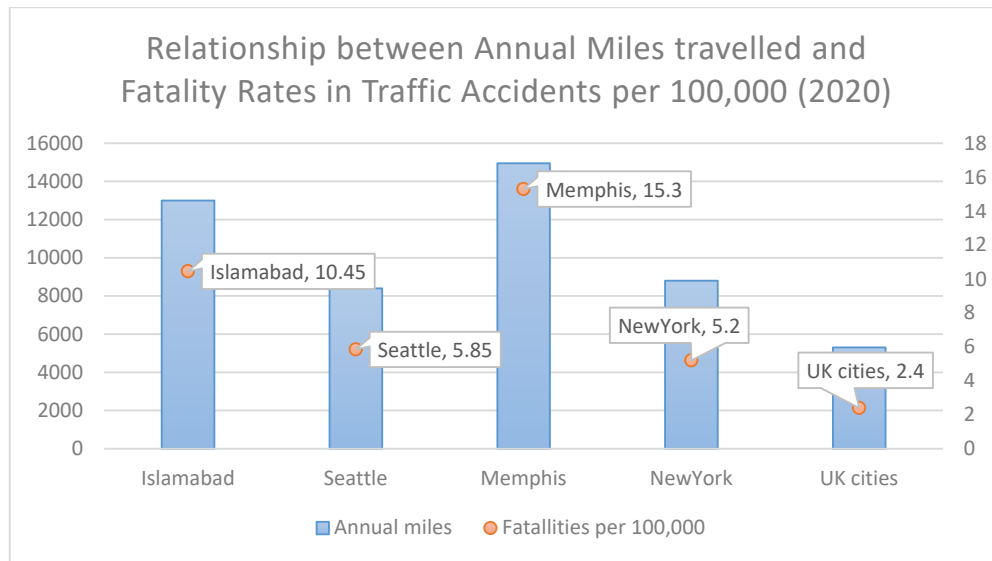
Figure 4.44. Bar chart shows the Relationship between annual miles traveled and fatality rates in traffic accidents per year per 100,000 (Source: Chart developed by using Data obtained from PBS, ITP and articles cited above)

4.5.4 Predict and Provide Approach

- **Signal Free Five Lane Islamabad Expressway; A short term solution?**

The Capital Development Authority (CDA) understands that the current problem of daily commuters will be resolved by constructing the 'Signal Free Five-Lane Islamabad Expressway' from 'Korang nullah' bridge to T-Chowk on GT Road near Rawat.

According to the Project Director Engr. Mumtaz Hussain once these two segments of the project are completed, most of the problems being confronted by commuters now will be mitigated to a great extent and the traffic load ahead will thin out considerably (Virk, 2019). But Anjum, a University of Engineering and Technology professor, has a different opinion. "How many underpasses will you build? If you free the flow of traffic at one crossing, it'll be choked at the next," Anjum says. "Road widening is not a remedy." (Naeem W. , 2014)

He says motorized transport is needed because the city sizes are growing and the only "viable solution is urban transport." Most of the public-sector transport systems around the world rely on trains and buses.

In an article published in Pakistan Today, a daily commuter on this route, Awan, recognizes the importance of buses in these words: "Small vehicles can get you through traffic at rush hour, but they don't offer decent seating like buses. Buses can also accommodate more people, so less number of vehicles would be required."

Another commuter Ghulam Muhammad, who travels daily from Rawat to Islamabad to his work place, said, "Whether 40 minutes or 14 minutes, I have to pay the same price for transport. For me, money is money and I have ample time. The expansion will improve the lives of those who have their own bikes and cars, whereas, for people like me, two lanes, five lanes or 10 lanes matter little." (Mohal, 2016).

4.5.5   The Stakeholders: Clash of those in Power

As a short term solution to the traffic problem at the Islamabad Expressway, the CDA had requested the government to allocate funds in the Public Sector Development Program (PSDP) in the budget for the fiscal year 2018-19 for the expansion of the existing Signal-Free Corridor.

With the election of new government in 2018, the funds for the project were frozen and it was pushed onto the backburner in the name of austerity drive by the current government. The CDA was then instructed by the government to complete the project under the public-private partnership.

Per the directives of the government, the CDA approached managements of private housing schemes which stood to benefit from these projects and asked them to finance 80 per cent of the project's cost. The societies agreed to this proposal after which digging work for the underpass near Korang Bridge began. Surprisingly though, the private partners stepped back from the provision of the promised sum.

As a result, work on the project came to a grinding halt. The CDA was expected to take up the issue again in the fiscal year of 2020-2021 (Chaudhry, 2020).

- **Who is responsible?**

Unlike other provinces, where Provincial Mass Transit Authorities exist, (which are responsible for planning, construction, operation and maintenance of mass transit systems in the major cities of the provinces) Islamabad, being the Federal capital, is left at the mercy of Capital Development Authority to resolve her public transport issues.

The existing BRT connecting the twin cities of Islamabad and Rawalpindi was also executed through the Rawalpindi Development Authority (RDA) as the single executing agency for both parts of the project while working in close coordination with the Capital Development Authority (CDA) for the Islamabad Part of the project. The funds were divided as 50:50 between the Federal and Punjab Government for this project.

- **CDA plans? A timeline:** (Naeem W. , 2014)

1. At one point, the plan for a bus service was shelved even though it was near completion.CDA officials offer several reasons for the plans coming to naught including lack of funds, political interference and lack of proper planning.

2. The civic agency's 2008 plan for a Rapid Mass Transit System (RMTS) went dud after security concerns scared a consultant away and the CDA ran into funding problems in 2009.

3. The summer of 2010 saw CDA get offers from consultant firms to perform a feasibility study for the transit system again.

4. The procurement of buses for Islamabad was ready in November 2011 but the financial crunch in the following year applied the brakes on the Rs400

million allocated for the "Islamabad Metro Bus Services" in CDA' annual budget for 2012-13.

5. In 2014, CDA prposed a Mass Transit Route but the proposal was postponed due to budget issues.

6. In 2020, as a result of a pre- feasibility study by Asian Development Bank on the 2014 proposal of CDA and NUST, 4 buses were procured as a part of Green Line and Blue Line, with 2 buses for each route. Following are the routes for both lines:
   - Green Line: Barakhau to PIMS
   - Blue Line: Rawat (Koral Interchange) to PIMS

- **The Solution: Commute and pollute?**

A study conducted in 2010 by Dr Sheikh Saeed Ahmad and Rabia Shabbir at Fatima Jinnah Women's University used vehicle registration data from 2000 to predict that if the growth in number of vehicles was left undeterred, the twin cities will have 34 million vehicles by the year 2030.These vehicles will add around 24 million tons of nitrogen oxides to the atmosphere, the study says. The study, by, claims that using more buses could lead to a 6-million-ton reduction in Nitrogen oxide emissions (Naeem W. , 2014). According to Dr Sheikh Saeed Ahmad "The way the population is growing in the twin cities, its better if we plan now for a public transport system."

- **Does the problem end here?**

There is no organized inter-city public transport system in place and private transporters running wagons and pickups are relied upon to fill the gap. The transporters have set 10 routes for wagons and around 12 for pickups in the city (Iqbal, 2017). Locals repeatedly complain about transporters overloading their vehicles especially wagons in which they use the small space behind the drivers' seat

meant for luggage to accommodate three passengers. In the overloaded wagons women passengers are only allowed to be seated next to the drivers' seat, where maximum two women can be accommodated.

According to a 2006 Asian Development Bank report, urbanization is likely to increase in the country by 140 per cent from 2010 to 2030 (Naeem O. A., 2012). This means the population in the twin cities, already an estimated 5 million, is bound to grow. In the absence of a decent public transport, more people mean more vehicles on the road.

4.5.6   The Missing Islamabad Transport Policy-Factors defining Planning Decisions

1.   Preference to Car: Car-ownership as a status symbol

According to Assistant Director, Directorate of Traffic Engineering and Transport Planning, CDA, there has always been a preference to car as the dominant form of transport in Islamabad primarily because of the Socio-Economic factor. As Islamabad was segregated into Sectors according to income groups, the same is translated in the usage and preference in the mode of transport. The lowest density Areas of E, F and D have 4 to 5 cars per household, which also include protocol and security cars according to the data available with ETO. In addition, various bank schemes promote vehicle purchase and have made it easier to purchase car on Loan in Islamabad. Simultaneously, there is a ban on Rickshaws, Qingqi and other sub-par Paratransit modes in the Capital city.

2.   Planning on Ad hoc basis:

There has not been a proper Transport Policy of Islamabad and all the decisions with regards to Transport planning are on ad hoc basis. The stakeholders involved in persuading CDA on these informal planning decisions are associated with Political parties hence less importance is given to pedestrians and bicycle riders and more to road facilitation for cars. This makes the current Private Public transport system

composed of Taxis and Wagons extremely expensive. Islamabad was primarily built for Services sector and civil servants. An expansion in Zones and later accommodation of other business especially the Real Estate Sector not only increased the land prices but also led to population growth which was unanticipated. This led to many decisions by CDA with regards to traffic congestion on emergency basis including Road expansion and addition of lanes in highways. Islamabad has an Incremental Development Policy, based on Predict and Provide approach. For instance, the now 5 lane Srinagar highways was initially built as a 2 Lane Road and was expanded as a solution to traffic congestion.

3. **Lack of Budget:**

Another reason why Public Transit system is not promoted in Islamabad is because of the financial constraints. Due to the fact that CDA is the only Transport Planning body in Islamabad and in the absence of a Federal Mass Transit Authority, it is difficult to allocate budgets for Metro routes or Buses. The budget allocation for such Mega projects is provided by Public Sector Development Program (PSDP), yearly approved in the Federal budget. For instance in Luxemburg, the Transit system takes up 500million dollars of the budget while producing a recovery of 50million dollars (CDA evaluation). For a city such as Islamabad, such investment becomes increasingly difficult. Since CDA is primarily an autonomous body, the projects in Islamabad are funded in two ways:

- If the Federal Government sponsors a project in Islamabad, it is done through Public Sector Development Program (PSDP). This is usually done for mega projects such as the current Metro Bus service in Islamabad. The Metro Bus Project in Islamabad costs 40-50 billion Rupees, such level of finance is not in the budget of CDA.
- If a project is of smaller nature and within the budget of CDA, it is completely funded by the authority. A board of Governors then decide which project is important and requires funding first.

4. Role of Political Parties:

By expansion of roads and development of interchanges, the political parties have something to show to the public in short period of time as compared to Mass transit routes which would take longer period of time for execution. These projects are used for political point scoring purposes in Islamabad. Along with this, a number of politicians are owners of agricultural land In Islamabad, which was once a part of Zone 4 and Zone 5. The development of roads along those routes increased the Real Estate value of the Agricultural land. Hence, the short term policy of Government is to gain maximum economic benefits by building or expanding highways. Also, due to the inconsistent political stability in the country, every Government tries to invest in short term projects in order to increase their vote bank and see off the completion of the project under their own tenure. They do not foresee the investment into Public Transport as a long term investment. Similarly, there are corruption elements in existing Public Transport setup; the Rawalpindi Ring Road and Barakahu Bypass was put on hold due to the involvement of Quaid e Azam University interference and other Political parties.

There is also a presence of Private Developers Association in Islamabad which is backed by Bureaucrats, Judiciary and politicians. From the 100 plus housing societies approved by the CDA, only 1 has filed for completion and submitted Layout Plan. It is of utmost importance to approve the housing society so that not only a road network is developed but also adequate infrastructure is provided.

5. Proposal and Initiatives by CDA:

In light of the current problems faced by residents of Islamabad with regards to Traffic congestion and lack of Integrated Public Transport Network, a proposal has been sent by CDA to the Federal Government to form Islamabad Mass Transit Authority to provide permanent solution to public transport woes of the Federal Capital.

Furthermore, CDA in coordination with NUST has identified Feeder Route Network in Islamabad which comprises of 13. A bid had been opened in which Faisal Movers have won the contract to oversee the running of these 90 electric buses. In the first phase, 45 buses will be procured.

An Integrated Public Transport Network is on the cards to be developed along with the provision of walking neighborhoods. It is proposed to conduct a Road safety Audit in which a dedicated study will be carried out to analyze Islamabad in terms of road design and walkability.

CDA identifies that along with provision for infrastructure for NMT, it is important to provide education to the users on the proper use of Sidewalks. Currently, it is observed that sidewalks outside houses are being used for plantation purposes and obstructions are placed for people on foot. This makes the sidewalk unusable especially for pedestrians on wheelchairs. Similarly, despite providing fencing for up to 250m near pedestrian bridges, users still try to cross the high speed freeways in Islamabad leading to fatal car crashes. It is important to involve Islamabad Traffic Police to ensure the implementation of laws with regards to Jaywalking.

6. Role of other Stakeholders:

There is an association of Private wagons which has disrupted any initiative by the CDA for providing safe, secure, efficient and economical Public Transport System in Islamabad. CDA had proposed a system of buses in early 2000s and then later in 2010. There were massive protests by the Local Transport Association who damaged not only the infrastructure but disrupted the bus operations as well. There was a constant threat to derail the initiative. The Local Transport providers neither have fixed routes nor provide adequate safety to the passengers. Primarily, the local transport in Islamabad is composed of Hyundai wagons and vans, which serve as Paratransit modes.

Figure 4.45. Wagon stops in different Markaz of Islamabad. Source; Google Maps

In 1990, Railway line from Rawalpindi Railway station Golra Station in Margalla hills was approved to run to cater to the intra city travel between twin cities. However after the fall of Government in 1990, the idea was shelved. Similarly, GTS in Islamabad also failed due to Private wagon drivers association.

7. Transportation Projects under CDA:

Currently, there are 2 divisions of Bus service in Islamabad under CDA;

- Metro Bus Service:
- Orange and Red Line: The Orange and Red Line is composed of 27 Routes, out of which 5 routes are operational which connect Zone 1 to Rawalpindi and New Islamabad Airport.
- Temporary Feeder Buses: These feeder buses run under the banner of Blue and Green Lines. The route is from PIMS to Rawat (Koral Interchange) and PIMS to Barakahu. Currently there are 20 buses on this route.
-

8. The missing Transport Policy; A timeline:

- In 2012, Asian Development Bank had proposed a Transport Policy for Islamabad in coordination with CDA but it was not approved.

- In collaboration with UNDP, CDA has developed a report on the importance of Federal Mass Transit Authority and its provision for the Federal Capital in 2012 but it was not approved.
- In 2014, CDA in coordination with NESPAK had identified routes for Green Line and Blue Line Buses in order to develop a Mass Transit Route.
- In 2020, a Pre- Feasibility study was done by Asian Development Bank on the report of NUST, Islamabad to identify Feeder Routes in the capital city. As a result, 13 Feeder routes were identified with 20 buses in total to cater to all the Zones of Islamabad. These Feeder routes are identified as Green Line and Blue Line. A total of 8 buses will be used for Green Line and 8 buses for Blue Line. The remaining 4 buses, 2 for each line, are kept as extra buses, to be used in case of any sort of malfunctioning with the Active buses. Following are the routes for both lines:
  - Green Line: Barakhau to PIMS
  - Blue Line: Rawat (Koral Interchange) to PIMS

CHAPTER 5

ZONE 5: THE AREA IN QUESTION

In the past few years, Islamabad has seen growth directed towards South East as opposed to how it was anticipated in the South West direction. This has brought Zone 5 under immense pressure of sub urban sprawl, along with daily traffic congestion due to the absence of Integrated Public Transport system. The following section discusses Zone 5 in detail, in light of its history, potentials and the problems faced currently by the residents of this area.

5.1 History of the Zone

Capital Development Authority in 1992, published Zoning Regulations for Islamabad Capital Territory, which outlined the following five zones for the Capital city (CDA, Islamabad Capital Territory Zoning Regulations, 1992):

1. *Zone-1:*

   Zone I constitutes sectors upto the existing alignment of the G.T. road from the point of intersection of G.T. road with Shahrah-e-Kashmir to the point of the Nicolson Monument inclusive of sector H-14, H-15, H-16, H-17, I-14, I-15, I-16, I17 2)

2. *Zone –2:*

   The zone consists of an area bounded by G.T. road in the north & north east, north of Shahrah-eKashmir and Capital limits in the west, comprising residential sectors G-15 (part), G-16, G-17, F-15 (part), F-16, F-17, E-15 (part), E-16, E-17, D-16, D-17, C-17, AND B-17. 3)

3. *Zone –3:*

   Margallah Hills National Park as notified under section 21 of the Islamabad Wild Life (Protection, Preservation, Conservation & Management)

Ordinance. 1979, Other protected ranges, forest areas and unacquired land falling between the Margallah Hills & north of Murree Road shall constitute this zone.

4. *Zone-4:*

   This zone comprises Islamabad Park and rural periphery wedged between Murree road towards north and Lehtrar road towards south and extending beyond Simly road upto the ICT limits in the north east. This zone excludes the part of Margallah Hills National Park and Rawal Lake.

5. *Zone-5:*

   This zone comprises areas falling south of Islamabad Park and extending upto outer limits of ICT towards south, south west and south east.

With the demarcation of Zone 5 in 1992 Zoning Regulations, CDA formally introduced Zone V as a non-sectoral Zone. Under the guidelines for development, CDA directed the organization of existing urban sprawl into a planned urban development while encouraging housing schemes.

Since the price of land per sft was much lower in this area as compared to Zone I and Zone II of Islamabad, private housing societies benefitted from the new regulations of CDA and acquired land at a fast pace for maximum economic benefits. Unlike Zone I and Zone II, CDA only provided broad outline development plan in whose context the schemes were to be considered for approval, in order to attract potential buyers and investors. In Zone I and Zone II, CDA had placed strict bye laws along with standard ROW which did not benefit the private Real Estate Developers.

In order to relieve itself from infrastructure development, CDA sanctioned the private schemes to develop their own independent accesses and roads, water supply and primary sewerage treatment systems at their own cost and expense. This subsequently led to feeder road issues and heavy traffic on Islamabad Expressway.

Proximity to other Zones

Zone is located at a distance of 28kms from Zero Point, Islamabad, lying in the south, southwest and southeast proximity of the Islamabad Capital Territory (ICT) limits. Zone V comprises of an area of 39,029.45 acres which equals to 157.9466km^2. Strategic roads connecting Zone V to the rest of Islamabad and other areas are Kahuta Road, T Chowk, GT Road and Islamabad Expressway.
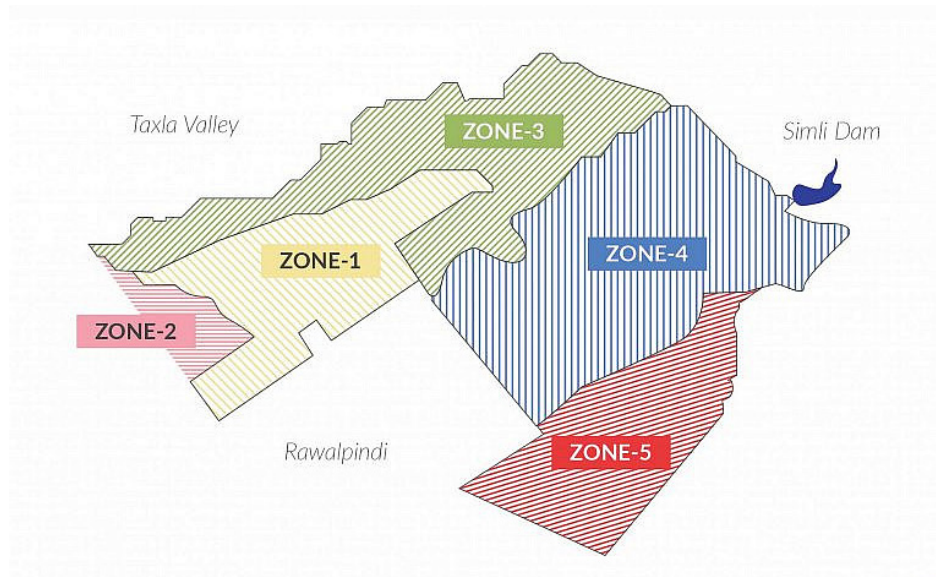
Figure 5.1. Image shows the location of Zone V Source: (Tahir, 2019)

Apart from the major residential societies in ZoneV namely Defence Housing Authority (DHA), Bahria Town sectors (Bahria Garden City and Phase 7), Jinnah Gardens, Naval Anchorage, there are more than 20 residential schemes and societies. In addition, Zone 5 currently houses 29 illegal private housing societies, all owned by private land developers (Societies, 2021). The shift has been favoured by both the developers and the residents owing to the price difference; where 1 marla[34] costs around PKR 3 million in the centre, the same is for PKR 0.9 million on average in

[34] Marla is a unit of area used in Indian subcontinent. In Islamabad, 1 Marla equals to 225 Sft/ 20.9 Sqm/ 25 Sqyd

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Zone 5 (Zameen.com, 2022). Despite being labelled as illegal by CDA[35], the buyers have not hesitated from purchasing land there or constructing houses owing to the 3 times lesser price of land as compared to the centre on average.

According to literature, suburban development has been favoured by economic forces, primarily because of the land value; land cost is fairly high in compact centres and cities as compared to the fringe where land is cheaper. This makes suburban development attractive for land developers particularly for uses such as residential development like villas or industrial development (Parapari, 2010).

5.2   Zone 5; MESO scale Analysis

5.2.1   Understanding the Land Use; Ped Shed Analysis

In order to understand and analyze the pedestrian catchment area in Zone 5 of Islamabad, various locations were selected and a Ped Shed Analysis was conducted. A Pedestrian Shed Analysis, commonly referred to as a Ped Shed Analysis defines the catchment area of a location in relation to the walking distance to or from that location rather than a radius from a centre point (Moon, 2022). This location can be a transportation node, a local communal area, educational centre, commercial area, town center, neighborhood center, or some other area of importance.

Scholarship suggests that the area for a Ped Shed analysis should be a 5 minute walk, which could be translated to 400 meters or 0.24 miles (Daniel & Burns, 2018). This distance makes the catchment area accessible for differently abled people, old and young alike, making it a comfortable walking distance for everyday commute. This

[35] Agro Farming and Residential Housing Schemes are permissible in Zone-4 under the provisions of ICT (Zoning) Regulation, 1992 [amended in 2010] and permissions are granted by CDA after completing the codal formalities (Societies, 2021)

method of analysis is essential to understand and analyze whether a location favours pedestrians or not.

In case of Zone 5, Islamabad, Ped Shed Analysis has been done on two scales; a 400 metre radius and a 800 metre radius. Where a 400 metre catchment area is comfortable and ideal for daily commute, a bigger radius of 800 metre translates to a 10 minute walking distance, highlighting other amenities present near the selected location.

Hence, on a scaled map, a circle of 400 metre and 800 metre radius around a location is drawn. Starting from the centre, basic facilities are marked within this radius. A boundary is estimated within a 0.8 km and 1.6km walk. This is the actual area from within which a pedestrian would be able to access a centre along the available streets within a five and ten minute walk. Within the area of Zone 5, streets and avenues that host selected points for Ped-Shed Analysis have been analyzed through Site Study to determine the provision of Non-Motorized transport in the form of footpaths, zebra crossings, pedestrian signals, bike lanes, etc. Following facilities have been marked:

1. Hospitals/Clinics
2. Grocery stores
3. Bus Stops
4. School
5. Bank
6. Mosque
7. Pharmacy
8. Post Office
9. Metro Station/ Public Transport
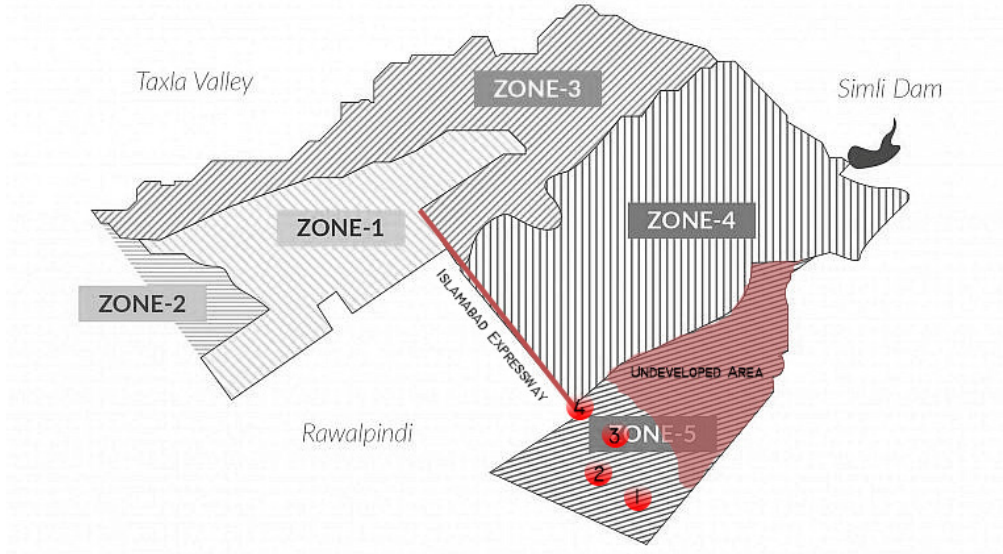
Figure 5.2. Ped-Shed Analysis locations in Zone 5 with respect to other zones. The red line indicates Islamabad Expressway and the shaded portion is undeveloped area of Zone 5. Source: Author

No.	Selected Area	Location
1.	Institute of Space and Technology, IST	Rawat, Zone 5
2.	Central Park, DHA 2	DHA 2, Zone 5
3.	Public Van Stop	Islamabad Expressway, Zone 5
4.	Punjab Cash and Carry, Supermarket	Soan Gardens, Zone 5

1. Institute of Space and Technology, Islamabad
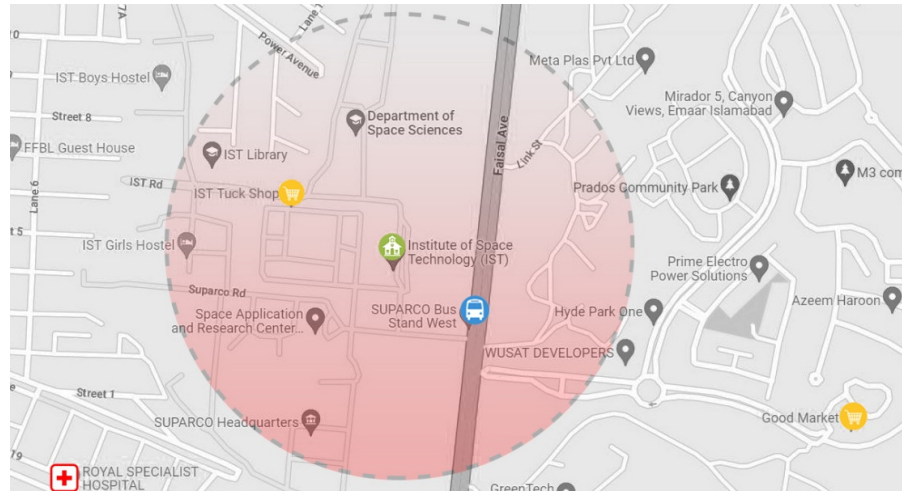
Figure 5.3. Ped-Shed Analysis of 400m radius near University. Source: Author

Within the 400m radius of IST, Islamabad, there is 1 local Bus stand for private wagons and 1 grocery store. Despite being within walking distance, the access to private wagon stop is difficult due to the absence of sidewalk.

Figure 5.4. Absence of sidewalk outside Institute of Space and Technology, Islamabad. Source: Author

Expanding this radius to 800m of the university, there is 1 mosque and 2 grocery stores. However, the university is in close proximity to the commercial centre of GT Road. There are also 3 fueling stations within the radius of 800m. Nearest hospital from IST is 500m away whereas the nearest Bus stop is at Rawat which is 1.5km away.
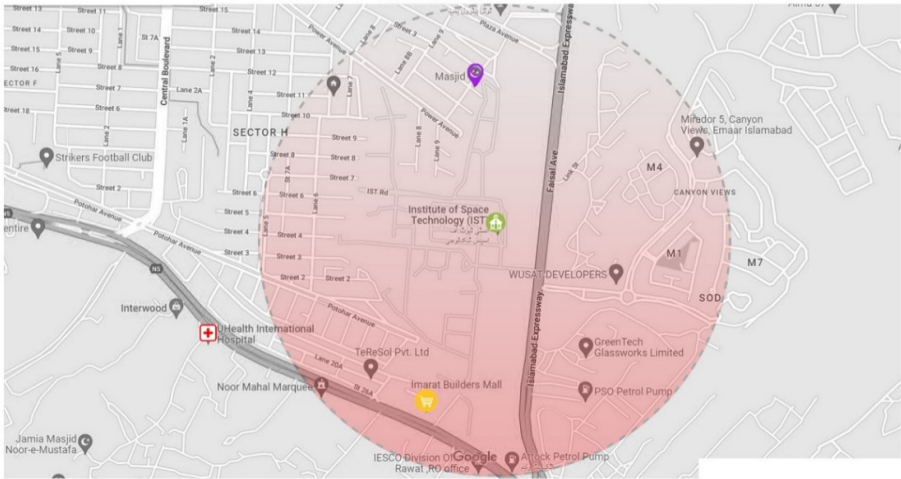
Figure 5.5. Ped-Shed Analysis of 800m radius near University. Source: Author

2. Central Park, DHA 2
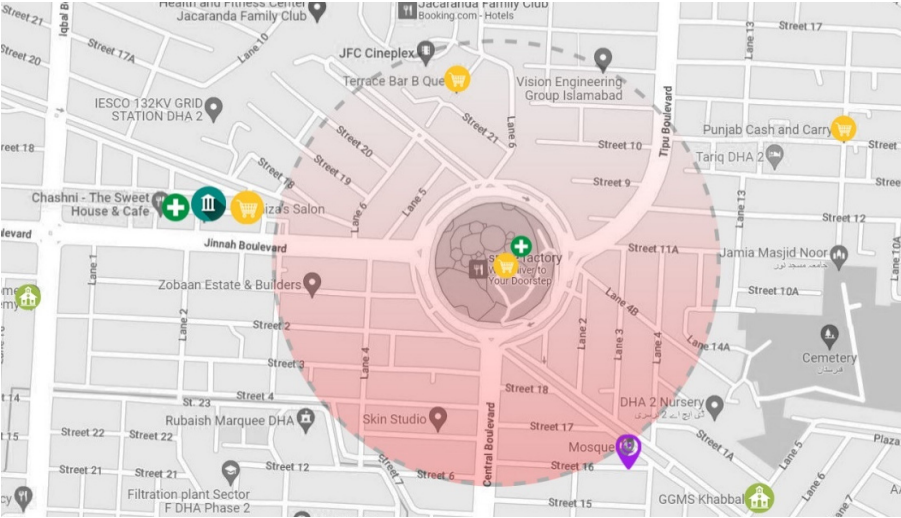
Figure 5.6. Ped-Shed Analysis of 400m radius near Central Park. Source: Author

Within the 400m radius of Central Park in DHA Phase 2, there are 2 Grocery stores, 1 pharmacy and 1 mosque.
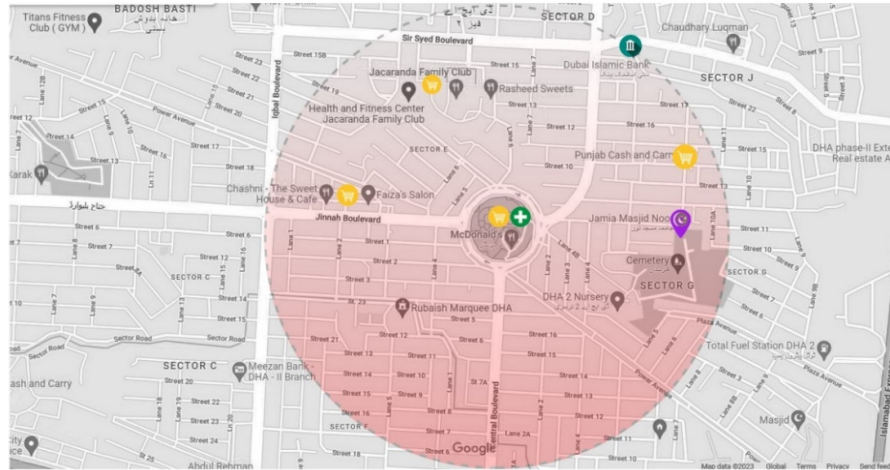
Figure 5.7. Ped-Shed Analysis of 800m radius near Central Park. Source: Author

Expanding this radius to 800m, there are 4 Grocery stores, 1 pharmacy, 1 mosque and 2 banks near Central Park, DHA Phase 2. The nearest Petrol Pump is 1.15km away, and nearest school 1.01km away. The only problem with this centre is that it does not have any connection to public transport, which is seen throught DHA Phase 2 gated community.
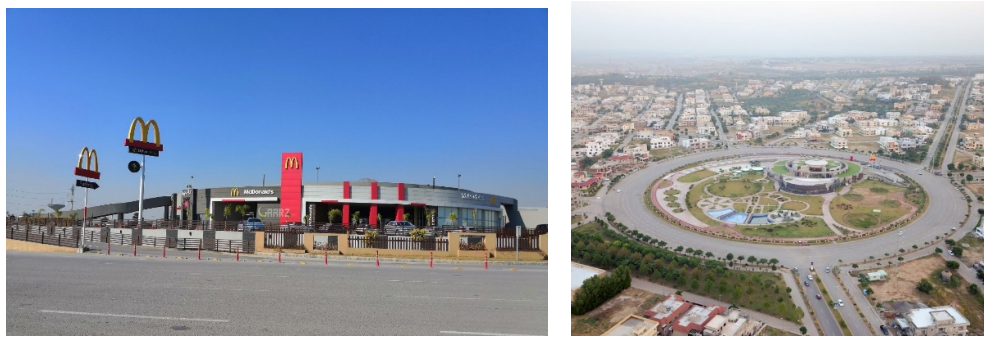
Figure 5.8. Pedestrians feel handicapped when they have to cross this road to go to the Family park or restaurants situated inside the Central Park.. Source: (Aarz.pk, Graana.com)

3. Public Van Stop

Within the 400m radius of Public Van Stop near Kaak Bridge, there is only 1 Grocery store and 1 bank.
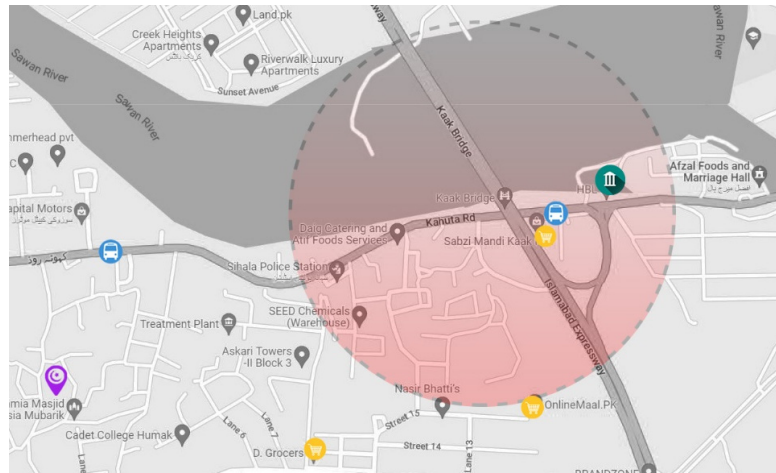
Figure 5.9. Ped Shed Analysis of 400m from Public Van Stop near Kaak Bridge. Source: Author

Within the 800m radius of Public Van Stop near Kaak Bridge, there are only 2 Grocery stores and 1 university. The nearest Petrol Pump is 1.41km away, mosque 1.51km away and hospital 927m away from the centre of the radius.

Figure 5.10. 800m radius Ped Shed Analysis of Public Van Stop near Kaak Bridge. Source: Author

Figure 5.11. Lack of sidewalk and proper van/wagon station near Kaak Bridge Public Van Stop. Source: Google Maps

4. Punjab Cash and Carry Supermarket:
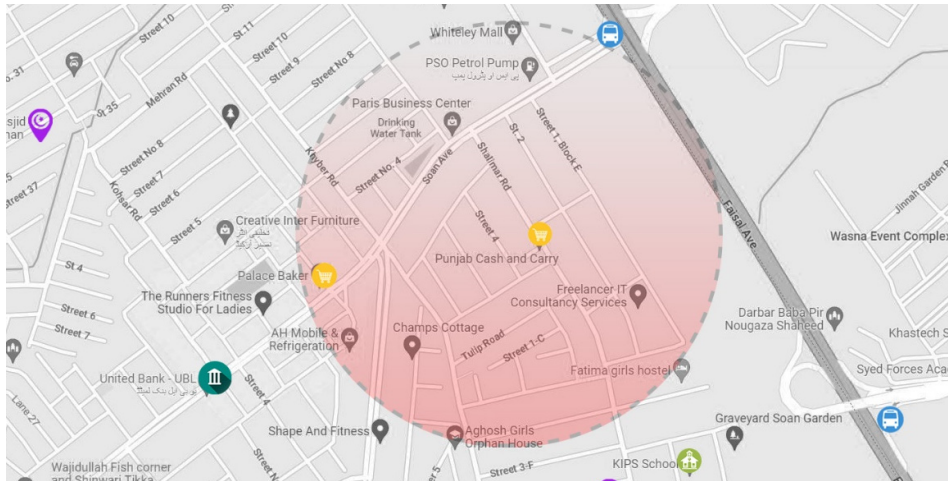
Figure 5.12. 400m Ped-Shed Analysis near Super market. Source: Author

Within the 400m radius of Punjab Cash and Carry Supermarket, there is only 1 wagon stop. Like other locations in Zone 5, there are no proper sidewalks to access Supermarket from the wagon stop.
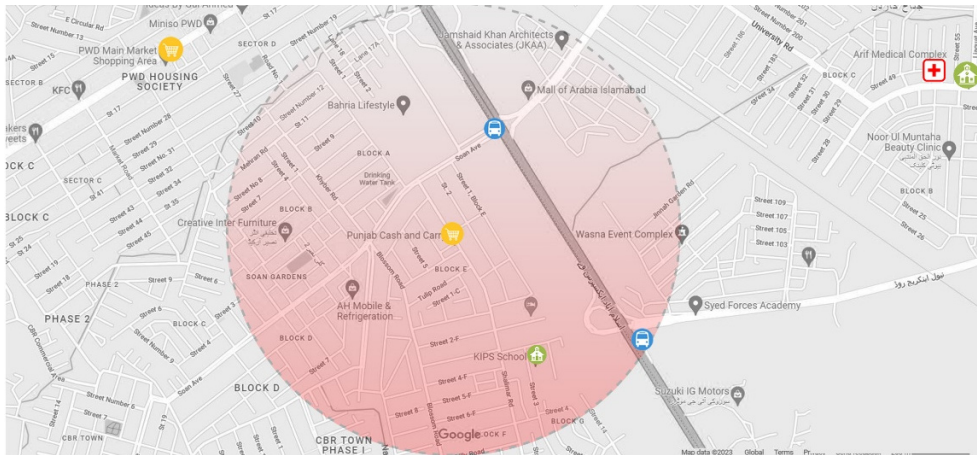
Figure 5.13. Ped-Shed Analysis of 800m radius near Super market. Source: Author

Within the 800m radius of Punjab Cash and Carry Supermarket, there are 2 wagon stops and 1 teaching academy. The nearest hospital is 1.78km away from the centre of the radius. In terms of accessibility, the super market has a considerably large catchment area with adequate connections to wagon stops, however there is an absence of sidewalks along the route which makes it difficult to access public transport.

Lack of Adequate Facilities:

The Ped Shed Analysis from different nodes shows that due to the non-sectoral nature of Zone 5, adequate facilities have not been provided near different nodes and the land use is greatly spread out. There is almost little to no provision of public transport options apart from private wagon stops which makes accessibility even difficult. There is a lack of provision for Non-Motorized Transport as well which makes the Zone vulnerable to Car-Dependence. In order to reach these nodes, the residents are solely dependent on either car or on the substandard wagons which are not only expensive but also do not follow a proper route and are inconsistent. Therefore, it becomes a matter of utmost importance to not only introduce mixed used programs in the nodes of Zone 5 but also give provision of Integrated Public

Transport System which can reduce the dependency on automobile and reduce private car ownership.

5.2.2   Residential Density and the Forecast

Islamabad has seen rapid urbanization in the past two decades. Apart from the economic opportunities in the Federal Capital, the terrorism wave post Afghan war in the Northern areas of Pakistan has increased the population at a much higher rate than anticipated. According to the data available with Pakistan Bureau of Statistics, Islamabad's rural population has increased by 6.95%, which is much higher than the country's rate of 2.2% whereas the urban population has seen a decrease of 15%, which is starkly in contrast to the increase in Pakistan's urban population by 3%. As discussed in the previous chapter, these numbers represent the rural areas of Zone 5 and Zone 4, which indicate a massive urban sprawl. According to Private Real Estate agencies, for Zone 5 alone, the forecast suggests that the current population of 0.25 million people will double within the next decade (Tahir, Islamabad Zone 5 – what does it hold for investors and the CDA?, 2019).

These numbers are alarming, with the already increasing number of car ownership and increasing congestion each day. Without provision of a proper Public Transport system and regulations by CDA to direct the urbanization and development of Zone II and vacant areas of Zone I, Islamabad will see a massive urban sprawl by 2030.

Moreover, there is an absence of implementation of bye laws in Zone 4 and Zone 5 of Islamabad. Real Estate Developers see a massive potential in Zone 5, particularly because of its proximity to Grand Trunk Road. Zone 5, due to its location, acts as a gateway connecting Punjab and KPK to Islamabad Metropolitan Area via Islamabad Expressway. This Zone, with its strategic location houses three major junctions that interconnect three arterial roads – Islamabad Expressway and Kahuta Road, GT Road and Kahuta Road, and Islamabad Expressway and GT Road. This in turn had not only attracted residents from other Zones of Islamabad but also from other

regions of Pakistan. This has led to the shift of commercial zone from the central core of Islamabad i.e. Blue Area to the section of GT Road near Zone V.

According to the biggest Private Real Estate Agency Graana, *"The section of Islamabad Expressway between Soan Gardens and T-Chowk is generally termed as 'The Golden Patch' or 'The Next Blue Area' due to exponential growth in both commercial and residential activities."* (Tahir, Islamabad Zone 5 – what does it hold for investors and the CDA?, 2019). Currently, the zone houses more than 10 mega projects of the city including Giga Mall, also known as World Trade Centre, Islamabad.

Apart from the lower price per sft than Zone I in Islamabad, the popularity of Zone V among residents is also due to the fact that it houses several gated residential communities which ensure the provision of efficient infrastructure along with security. All these factors have led to the massive population growth in this Zone, increasing the congestion on the roads specifically Islamabad Expressway. Despite the interest of investors in residential and commercial projects in Zone V, little attention has been given to its connection via Public Transport and to Road Infrastructure maintenance.

According to World Population Review, the urban population in Islamabad is set to rise by 2% every year; which is expected to settle in Zone V due to the lower land value and the availability of land as well as the increasing commercial value.

5.2.3   Density, Land Use and Congestion

Similar to the absence of Public Transport, Zone 5 does not have comprehensive by-laws for commercial real estate development, which leads to traffic congestion in and around these zones. Along with this, Zone 5 is also facing the issue of horizontal expansion, rather than going vertical, which is creating low-density in the area similar to Islamabad's central core. Currently, Zone 5 has a Residential Density of 10.579 persons per hectare, with 1.80 dwellings per hectare. This is lower than

Islamabad's central core of Zone I, which has a residential density 22.869 persons per hectare against 3.9 dwellings per hectare. It is of utmost importance to shift towards vertical expansion rather than moving horizontal to prevent unsustainable development in Zone V.

Zone V being a non-sectoral zone, does not have its own social, economic and educational facilities and opportunities like the ones in Zone I. This leads to the reliance of residents of Zone V on Zone I, eventually increasing commute times for work, education and health purposes. As discussed in the previous chapter, the average kms per year for residents of Zone V amounts to 24,000 kms whereas Zone I residents drive almost 10,000 kms per year less than this number. Currently, Zone I of Islamabad houses all the major educational institutions, private and government offices as well as health services which makes the daily travel almost inevitable.

5.2.4   Who is Responsible; Stakeholder Analysis

In order to understand the issue of congestion on Islamabad Expressway and the reasons behind the missing layer of Integrated Public Transport, a Stakeholder analysis was done on the ongoing project of expansion of Korang Bridge and the Construction of PWD Interchange, to understand how this project is being funded along with the strategy of CDA to curtail the problem of automobile dependency in Islamabad.

According to CDA, the main aim of this project is to ease the commute for millions of inhabitants of Zone 5, Islamabad and improve the traffic flow. The specific objective is to make it much easier to enter and exit the Islamabad Expressway for the hundreds of thousands of residents living across these housing societies by expansion of Korang Bridge and construction of Pakistan Public Works Department Housing Society (PWD) Interchange. The expected impact would be the cut down of travelling time by 40% atleast on completion of these two projects, for residents living in nearby housing societies. A signal-free corridor all the way to the Grand

Trunk (G.T.) road in Rawat area will make it easier for the residents to commute between the Federal Capital and other cities of Pakistan. It is also anticipated, that a reduction in traffic will significantly reduce the number of traffic accidents on this route along with improving Islamabad's Air Quality Index.
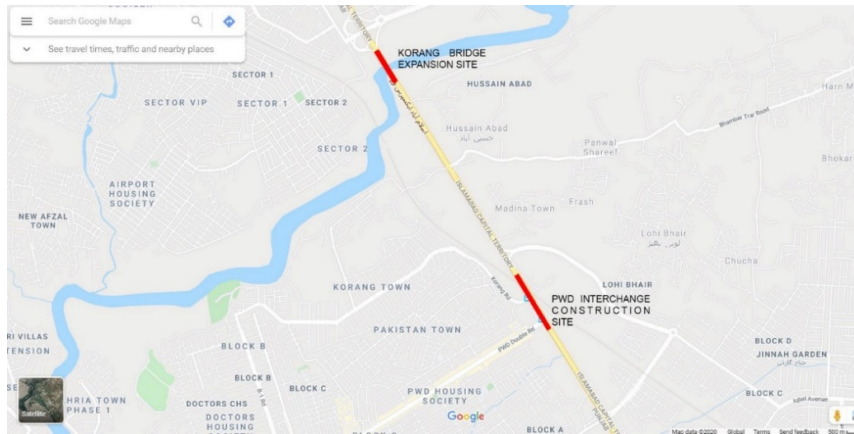
Figure 5.14. The map above shows location of the two projects; Korang Bridge Expansion and PWD Interchange Construction.

The main target group of the project is people living in the Zone 5 of Islamabad, from Koral Chowk to Rawat, who will be directly affected from physical interventions, and the Capital Development Authority (CDA), being the main competent party for the management. Direct beneficiaries are the residents of Zone 5 and other people using Islamabad Expressway for their daily commute, while the indirect beneficiaries consist of all, directly or indirectly involved in the real estate sector from Koral Chowk to Rawat, Islamabad. The people heading from Islamabad towards cities of Pakistan which are connected through G.T. Road will also benefit from it.
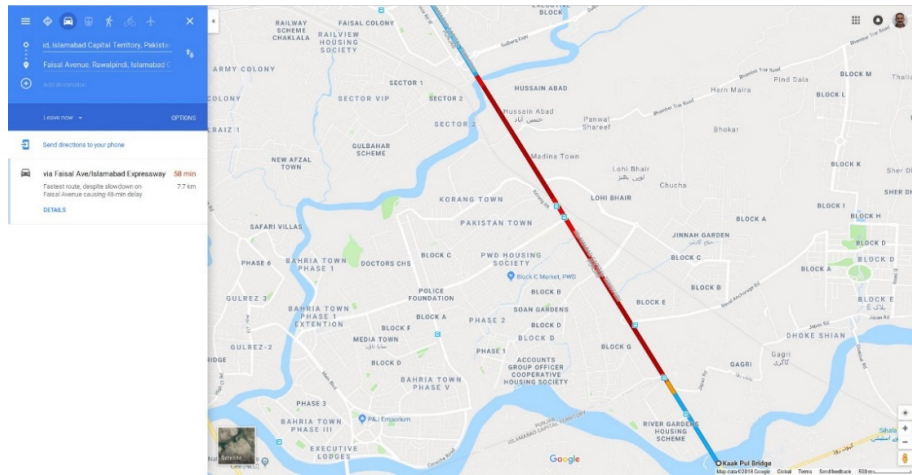
Figure 5.15. A Picture fetched from Internet during peak time of 6pm shows how a part of 7.7km in this 15km long patch will be covered in 58 minutes. Source: https://twitter.com/IndepObserver/status/1016606324929462272/photo/1

A comprehensive stakeholder analysis of the project highlights the following stakeholders responsible for Automobile dependency in Islamabad:

1. **Capital Development Authority (CDA):**

In the absence of Provincial Mass Transit Authority, Capital Development Authority has a high potential impact ratings in all the transportation issues of Islamabad. It not only holds the responsibility to sanction any project related to Transportation issues of the Federal Capital, but is also responsible to brief the Federal Government about it in order to obtain timely funds.

Similarly, being the only development authority of the Federal Capital, the CDA has to act as a coordinator between various stakeholders including the Private Housing Societies which have illegally built on agricultural land and aided in the suburban sprawl. CDA also holds the responsibility of tackling the private wagon asociation which is responsible for the failure of earlier Bus Transit projects in the Federal Capital.

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2. Federal Government:

The Federal Government is responsible to allocate funds in the country's annual budget. Mega Projects such as Bus Rapid Transit and other Public transport initiatives can only be funded through Public Sector Development Program (PSDP). Hence it is the responsibility of Federal Government to coordinate with CDA on issues regarding lack of budget and priority of projects. Similarly, Federal Government must sanction the formation of a Federal Mass Transit Authority for Islamabad which can look into the issues regarding provision of quality public transport in the capital. With the lack of a Transport Policy, the transportation issues of the Federal Capital are only dealt on ad hoc basis by CDA Traffic Engineering Wing.

3. Private Housing Authorities:

Private Housing Authorities in Zone V should get relevant NOCs from CDA and develop their residential societies within the bye laws defined by the Authority so as to curtail urban sprawl. Similarly, efficient connections in the form of Shuttle services and feeder buses as well as provision of Non-Motorized Transport should be provided to the residents within the gated boundaries of the residential societies.

4. Islamabad Traffic Police:

ITP is not only responsible for the smooth flow of traffic in the Federal Capital, but should also ensure that citizens are educated on traffic rules. Fatalities in Car crash can be greatly reduced by revising the Speed Limits in different types of roads along with the education of pedestrians on the consequences of jaywalking on highways. Congestion Mapping by ITP during peak and non-peak times can also help Federal Government to understand the issue of automobile dependency in Islamabad.

5. Excise and Taxation Office:

ETO is responsible to issue registration numbers to vehicles in the Federal Capital. By timely sharing the yearly Car ownership data with Pakistan Bureau of Statistics, ITP and CDA, the trend of increased Car ownership can be detected and automobile can be reduced. Similarly, ETO can check the condition of vehicles being registered and help in identifying the unsuitable vehicles by coordinating with ITP, which can decrease air pollution.

6. Residents:

The residents can support Public Transport Projects by rejecting the usage of car as a status symbol, which is currently prevalent in Islamabad. Similarly, the residents should report illegal housing authorities to the CDA so that the problem of urban sprawl can be curtailed. Residents should also cooperate with ITP to ensure the smooth flow of traffic.

An example could be of the protests done by the residents against the construction of Westway, a 2.5 mile urban motorway project in London. Constructed between 1962 and 1970, the project attracted widespread criticism due to the environmental impacts it had on the surrounding areas, as well as the well-being of local residents whose homes were demolished (Wikipedia contributors, 2023)..

After the inauguration of the motorway, protests continued until 1973, however the residents who were affected by the construction were not compensated. In 1971, Westway Development Trust was founded to develop the land for local community use. As a result of the massive protests, most of the London Ringways scheme were cancelled in 1973 and were later built as all-purpose roads ("Western Avenue grievance". , 1970).

Similar associations can be formed by the residents of Islamabad to discourage illegal practices and projects which affect the surrounding environment negatively.

Table 5.1 Table shows the Stakeholder analysis done for CDA's project of expansion of Korang Bridge and the Construction of PWD Interchange. Source: Author

Stakeholders	Share in the Project	Potential Impact Rating in the Project	Project's expectations from the stakeholder?	Stakeholders' observed attitudes / risks	Stakeholder Management Strategy	Task
Capital Development Authority(CDA)	Public benefit corporation of Islamabad responsible for estate management, project execution and sector developments	High	1. Sanction the expansion of Islamabad Expressway 2. Brief Federal Government on the severity of traffic issue to get funds 3. Coordinate with Private Housing Societies on the construction of connections from Highway to their societies 4. Sanction the construction of a By-Pass for Heavy Traffic	1. No coordination with Private Housing Societies 2. Sole Development Authority of Islamabad hence cannot manage all types of projects 3. Ineffective in explaining the severity of traffic Issue on Islamabad Highway to the Federal Government	Develop a PC-1 after thorough research for the expansion of Islamabad Expressway; Sub-divide the project into two phases so that the project can be funded by the Government, Explain the necessity of the project to the concerned authorities of the Federal Government. Develop a strategy to auction commercial plots in Islamabad to fund rest of the project.	Project Manager
Federal Government	Responsible to allocate funds in the country's annual budget	High	Allocate funds in the country's annual budget for expansion of Islamabad Highway	Low interest in the project	Coordinate with CDA to understand issues of Islamabad	Project Sponsor
Private Housing Authorities	Provide facilities to the residents of their societies	Middle	Finance the construction of connections from Islamabad Highway to their societies	Not taking responsibility of the project	Allocate funds from the development fees received from the residents each month for the construction of connections from Islamabad Highway	Project Beneficiary
Islamabad Capital Territory Traffic Police	Facilitator: Regulate the flow of Heavy Traffic on Islamabad Highway	Low	Manage Heavy Traffic flow on Islamabad Highway	Not ensuring the following of orders on ground issued by higher authorities	Allocate more traffic wardens on Islamabad Highway	Project Team
Residents of Private Housing Societies (Zone 5, Islamabad)	Beneficiaries of the project: 1. Support the Private Housing Society in building the connections from Islamabad Highway to their society 2. Cooperate with Traffic Police to ensure smooth flow of traffic	High	• Pay the monthly development fees to the Private Society so that the connections from Islamabad Highway to their society could be built. • Reduce the use of private cars and use more public transport	• Commute cost has increased • Affected by the noise and air pollution • Journey time has increased • Safety on road is compromised due to daily accidents	Participation in measures announced by the Private Housing Authority and Islamabad Traffic Police	Project Beneficiaries

CHAPTER 6

CONCLUSION

The study was initiated with the observance of Automobile dependency in the modernist planned city of Islamabad. Developed as a self-sufficient city, the automobile dependency came as a contrast to how it was envisaged as the city did not expand as expected. Following the concept of a Dynapolis, the city growth was pre-determined towards South-west direction, in a linear pattern. However, the city expanded away from the central core making the centre low in density. This eventually resulted in urban sprawl along with increased use of automobile causing severe traffic congestion on major highways of Islamabad. Since Islamabad is one of the few planned cities in Pakistan, the recent urban sprawl has been the point of discussion and concern. While some quarters predict the current traffic congestions as temporary, a detail inspection on Islamabad's Master plan and the role of stakeholders tell a different story.

The research focuses on the characteristics of the modernist planned cities that make them unsustainable by promoting urban sprawl. At the same time, the study tries to understand the role of stakeholders' in implementing the predetermined growth pattern in a city. As discussed earlier, Doxiadis had imagined a pre-determined growth pattern for Islamabad, however, the city expanded away from the central core leading to low-density in the metropolitan area. The thesis tries to investigate this phenomena by understanding the processes which put a "Plan" into "Action" in real time conditions. Simultaneously, it tries to analyze the role of all the stakeholders that results in automobile dependency. The main aim of the thesis is to highlight the modernist planning practices which lead to low-density

Scholarship suggests that one of the causes of automobile dependency in modernist cities is the low-density sprawling development, which occurs due to the defining characteristics of a modernist plan. Similarly, there has been an ongoing discussion that automobile dependence can be reduced by improving urban planning by integrating work, shopping and community services with residential neighborhoods. The thesis aims to investigate this debate, while exploring the relationship between Modernist Urban planning and automobile dependency, by looking at the common characteristics of modernist cities. The research also aims to explore that how modernist planning leads to cities with low-density by studying the example of Islamabad, the Capital of Pakistan.

The observance of automobile dependency, traffic congestion, low-density and urban sprawl were the initial frame of reference which led to the exploration of the relationship between modernist plans and automobile dependency. This was overlapped with extensive literature review on the inception of modernist planned cities, their common characteristics and their behaviors with regards to future growth. Automobile dependency along with its indicators is then studied to understand the phenomena and its prevalence in Islamabad. Similarly, the implementation of pre-determined growth pattern is understood by observing the changes in zoning regulations of Islamabad over the years. The zoning revisions as well as review of Masterplan is an indication that they not only address future implications but also address and regularize the current issues.

As discussed earlier, the main aim of the thesis was to investigate a possible relationship between automobile dependency and modernist planned cities. The research also aims to explore the range of Stakeholders and their role in the creation of urban sprawl and automobile dependency. This was of immense significance in order to understand the power politics which directs the growth of a city and its operationalization. According to these guidelines, the research has been summarized under the following framework:

1. Relationship between Modernist Planned Cities and Automobile Dependency
2. The Role of Stakeholders

Relationship between Modernist Planned Cities and Automobile Dependency

By studying the characteristics of modernist planned cities, a possible relationship or parallel between the modernist cities and automobile dependency is investigated. Studying these characteristics in a wider perspective helped to critically analyze Islamabad in the light of the results. The major findings are elaborated as under:

- Zoning according to Land Use

Inspired by "The Charter of Athens" and adopted by the functionalists during post World War II, zoning according to Land Use is seen as a defining characteristic in modernist planned cities. The regulation segregates different types of land use into separate zones so that there is no overlapping of functions. For instance, residential, commercial, retail, industrial, etc. land uses are placed in their own separate zones, so that each zone has only one land use. This in turn makes the cities static leading to urban sprawl.

Islamabad is one such example which is read through four main functions; Residence, Transport, Recreation and Work as explained in detail in Chapter 4. Developed on the concept of self-sufficient neighborhoods, the segregated land use planning increased the distances between essential functions, eventually leading to increased mobility. With the absence of Integrated Public Transport Network, automobile dependency started to increase along with the greater number of average kms traveled annually, creating congestion issues in the city. Hence, Zoning according to Land use can be seen as of the main reasons of low-density in the centre leading to urban sprawl and greater distances travelled between functions.

- <u>Preference to Highways; Predict and Provide Approach</u>

Another defining characteristic of Modernist cities is wide boulevards and highways. Developed during the industrial revolution, where car was representation of wealth, cities were designed in a way so as to give preference to cars over pedestrians. This led to high speed highways and freeways, making the use of car dominant over Non-Motorized forms of transport. The introduction of high speed highways overlapped with the concept of zoning according to land use. It was perceived that far-fetched zones can be easily accessed through cars due to the signal free nature of highway; greater distance can be covered in shorter time as opposed to the time taken by any form of public transport.

By introducing highways and free-ways, modernist planning somehow promoted the idea of suburbs. Through this initiative, the much cheaper land in suburb became accessible as well, hence people started to prefer building in the suburbs rather than in the centre, which was far more expensive. Hence, the Land use zoning regulations, along with the provision of highways, low-density and suburban sprawl can be seen in a loop, where each regulation promoted the introduction of the other. Similarly, when car becomes the dominant form of transport, congestion is observed on these high speed highways, which increases the commute time. In order to overturn this, Modernist cities use the "Predict and Provide" approach rather than "Predict and Prevent" which eventually leads to Induced traffic as discussed in Chapter 2 in detail.

Research shows that automobile dependency leads to wider roads and increased traffic, which in turn creates inequality for Non-Motorized Transport and pedestrians. Conventional transport planning practices also support this cycle of Predict and Provide; a hypothesis where past traffic numbers are used to predict future travel demand; which results in adding more road infrastructure that supports automobile transport. This prediction then directs all the public funding and existing land, which could have been used for Non-Motorized transport or other purposes, towards more roads or additional lanes for automobile traffic.

The starting points of Islamabad Master Plan were developed from the axis of 4 highways, which intersected at right angles. This laid the foundation of the future transportation decisions of the city; by planning high-speed highways to connect different zones of Islamabad, Car was unofficially listed as the dominant mode of transportation. What the following years saw was a massive increase in car ownership in the Federal Capital leading to congestion on roads in peak and non-peak times. What followed was a cycle of Predict and Provide approach, where the solution to traffic congestion was perceived to be an addition of Lane. Srinagar Highway (Originally called Murree Highway in Doxiadis Plan) changed from 2 to 5 Lanes and is continuously expanding. Similar is the fate of Islamabad Expressway, which has increased from 4 Lane to 10 Lane over a period of 12 years.

Among various other reasons, the provision of highways to connect different Zones of Islamabad has also contributed to the sub-urban sprawl. Zone V, located at a distance of 25kms from the centre of Islamabad currently houses 0.25 million residents, who commute daily for a length of 28kms to reach their workplaces, schools and universities. Without the presence of any public transport system, the only available mode of transport is the use of private car which leads to massive congestion during peak and non-peak times on these highways increasing not only the commute time but also the fuel cost. All these factors have contributed to a greater carbon foot print and emissions in the city.

- Socio-Economic Division

Apart from Zoning according to Land use, another segregation that is observed in modernist cities is the division according to income groups of residents. Similar to zoning according to income groups in other modernist cities, Doxiadis proposed that Civil Servants should be separated with the other residents of Islamabad by accommodating them in Sector G along with providing them with Government Housing.

By assigning sectors according to income groups, a great variation has been observed in the land prices of Zone I as compared to the Non-Sectoral Zones of Islamabad i.e. Zone IV and Zone V. This in turn has increased the land prices of the central core 3 times as compared to those in the suburbs eventually leading to living in the centre unaffordable. Hence, this feature of the masterplan has increasingly led to urban sprawl in Islamabad, forcing the citizens to shift from the urban area to the suburbs of Zone IV and Zone V, making the center low in density.

- <u>Low-Density Development</u>

Modernist cities by separation of Zones according to functions led to lower densities. This was primarily due to the increasing car ownership and the development of Freeways, which led to the development of Suburbs. The segregation of Work, Leisure and Living created such pattern of trips that made the provision of Public transport and use of Non-Motorized forms of transport inefficient. Scholarship suggests that Lower average densities eventually leads to a decline in NMT and increase the trip lengths due to reduced catchment area for Public Transport.

Islamabad has also been inspired by the American suburban model, with each sector comprising of single family homes (Hasan et al., 2021). The residential sectors only accommodating single family units and the work places confined to Secretariat and Blue Area[36], eventually led to Urban sprawl; increasing travel time, pollution and destruction of agricultural land. The zoning paradigm promoted low-density residential areas and did not encourage high-rise mixed use development neither did the development of CBD favored walkability, which was aligned around highways on both sides.

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[36] Central Business District- CBD

In the Doxiadis plan, Islamabad was developed as a small, low-density city. The functionality fell when the city expanded beyond the original anticipated numbers and the land use zones became difficult to access from all parts of the city. An analysis of data obtained from Capital Development Authority and Pakistan Bureau of Statistics shows that, Zone I, despite being the oldest developed Zone and the central Metropolitan Area is low in density with 22.869 persons per Hectare and 3.9 Dwellings per Hectare. Zone IV and Zone V, the suburban Zones proposed by CDA in 1992 Revision of Masterplan, only have a density of 2.86 and 10.579 persons per Hectare. A comparison with Automobile dependent cities in US and Australia shows a similar number as discussed in Chapter 4 in detail. Hence, the general trend in Islamabad shows extremely low-density in the centre as well as the outer suburban area.

The role of Stakeholders

By exploring the processes behind the development and implementation of Islamabad's Masterplan, a wide range of stakeholders were identified, whose involvement or the lack of it have led to sustainability issues in the city.

- <u>Implementation Authority</u>

Capital Development Authority, is the sole public benefit corporation responsible for providing municipal services in Islamabad Capital Territory. Among other responsibilities, CDA is responsible to regulate, revise and implement the Master Plan of Islamabad.

Some of the major problems faced by Islamabad today, i.e. urban sprawl, low-density and automobile dependency has been partly due to the decisions made by CDA. In the Zoning regulations of 1992, CDA had changed the land use of Zone IV, which was earlier limited to only agricultural farms and institutions of National Importance. By extending the boundaries and introducing Zone V as a non-sectoral Zone, CDA promoted the development of suburb rather the undertaking measures which would increase the density of the centre i.e. Zone I and Zone II. This was also due to the

fact that the authority failed to regularize the price/sft in different zones of the city. The massive difference between the land prices along with the Zoning regulations of Zone II made the private real estate developers inclined towards development in Zone IV and Zone V rather than unused land in Zone I and Zone II as discussed in Chapter 4 and Chapter 5.

Similarly, in the absence of Provincial Mass Transit Authority, Capital Development Authority has a high potential impact ratings in all the transportation issues of Islamabad. It not only holds the responsibility to sanction any project related to Transportation issues of the Federal Capital, but is also responsible to brief the Federal Government about it in order to obtain timely funds. CDA has failed to introduce an Integrated Public Transport system as well providing and maintain infrastructure for Non-Motorized forms of transport. CDA also holds the responsibility of tackling the private wagon association which is responsible for the failure of earlier Bus Transit projects in the Federal Capital. All of these planning decisions have led to urban sprawl and low-density in the city leading to automobile dependency.

- Private Real-Estate and Sub-urban Sprawl

Research shows that planning decisions on part of Capital Development Authority have led to the migration of citizens from the centre to the periphery. In general, suburban development has been favoured by economic forces, primarily because of the land value; land cost is fairly high in compact centres and cities as compared to the fringe where land is cheaper. This makes suburban development attractive for land developers particularly for uses such as residential development like villas or industrial development (Parapari, 2010).

The same can be seen in Zone 5 of Islamabad, Pakistan. Located at a distance of 25kms from the centre of the city i.e. Zero Point, Zone 5 currently houses 29 illegal private housing societies, all owned by private land developers. The shift has been

favoured by both the developers and the residents owing to the price difference; where price/sft is 3 times greater in Zone I as compare to Zone V. The same is witnessed in the agricultural area of the capital, Chak Shahzad, earlier reserved for farm houses and agricultural land use currently houses 83 illegal residential societies. Despite being labelled as illegal by CDA, the development authority of Islamabad; the buyers have not hesitated from purchasing land there or constructing houses owing to the 3 times lesser price of land as compared to the centre on average. Despite having an annual average mileage of 24,000km, residents of Zone V still prefer to live in the area due to three times lesser price of land as compared to the centre in Zone I and Zone II.

- Lack of Transport Policy

Among the stakeholders, policies serve a major part in promoting automobile dependency. Underpricing, limited alternative choices, weak competition, bias towards automobile in planning and investment, all form a part to promote automobile usage. In Islamabad as well, transportation evaluation practices focus mainly on vehicle traffic, evaluating roadway service, average speed and congestion delays and provide solution that would favor automobile dependency while giving little importance to other modes. NMT, on the other hand, is mostly ignored with a preconceived notion that the population of Islamabad prefers car over Public Transport and NMT and holds car ownership as a status symbol.

This is coupled by a lack of Transport Policy, which leads to all decisions made on ad hoc basis. Despite multiple proposals by CDA in coordination with Asian Development Bank, NESPAK and NUST, till date, the capital city does not have a proper and official transport policy. The decisions are mostly made on Predict and Provide basis, with the preference given to Private Car Ownership. As a solution to traffic congestion, every year, a hefty amount is approved in the Federal Budget to increase lanes of already wide highways in Islamabad.

Research has also shown that automobile dependency is a cycle; as a community becomes increasingly automobile dependent, the users who rely on other transportation modes decrease, hence making the stakeholders further affirmative on their idea that increased road infrastructure is the only solution and need. This leads to public policies and decisions which give preference to automobile over other modes of transport. Similarly as the communities become dependent on automobile, the population that seeks alternative modes of travel begins to shrink. This brings in more profits to the private stakeholders, who then have to spend less on public transport infrastructure. Islamabad faces a similar problem as well. The Traffic Engineering Department in CDA believes that Public Transport projects do not generate revenue and are mostly run in losses, which is difficult to sustain in a developing country like Pakistan.

It is of utmost importance, that the Federal Government should not only sanction the development of a Federal Mass Transit Authority for Islamabad, which can solely look at the transportation issues of the city but also develop a transport policy so that all the decisions regarding transport are regularized and follow a direction.

- Private Transport Association

Among other factors, Islamabad faces a huge problem of Private Transport Association, which has time and again led to the failure of all kinds of Public Transport Initiatives. There is no organized inter-city public transport system in place and private transporters running wagons and pickups are relied upon to fill the gap. The transporters have set 10 routes for wagons and around 12 for pickups in the city. Locals repeatedly complain about transporters overloading their vehicles especially wagons in which they use the small space behind the drivers' seat meant for luggage to accommodate three passengers. In the overloaded wagons women passengers are only allowed to be seated next to the drivers' seat, where maximum two women can

be accommodated. This situation overlaps proves the research that in the cities that are highly automobile dependent, the users do not have transportation alternative which is accessible, economical and promote equity. It is of utmost importance to integrate these private wagons and pickups in the Public Transport Network of Islamabad, where these paratransit options can serve as feeders and shuttles, transporting passengers from Metro and BRT stations to their final destination or point of arrival.

Shortcomings and Limitations

Owing to the limitations of time and resources, a survey could not be conducted to test the pre-conceived notion that citizens in Islamabad see Car ownership as a status symbol and would prefer it over Public Transport. Similarly, the focus of Ped Shed analysis is only limited to Zone 5 of Islamabad to understand the Public Transport and Accessibility issues.

While it may be argued that selecting a single area to comprehend the issues of automobile dependency in Islamabad might create a generalization or lead to a conclusion that is reimagined, the use of different scales at MACRO and MESO level to study various parameters would help in countering this issue.

The Secondary data used for the analysis of the Land cover in Islamabad in Chapter 4 had used geospatial techniques which could have discrepancies due to the variations in images owing to the meteorological conditions prevailing at the time of the observation. However, the study contributes a new dimension to research by overlapping the Zoning regulations by CDA on the study time period to observe and enumerate the causes which led to the reduction in agricultural farmland and an increase in the urban populated area. Similarly, the study helps to identify the growth pattern variation of Islamabad, which was anticipated to grow along the Central Business District in the East West axis but has in reality expanded away from the central core towards Zone V and Zone IV, making the centre low in density. It is also

recommended that the population census along with the land cover changes should be mapped at regular intervals so as to contribute to the environment and prevent unsustainable practices.

Future Implications of the Research

There has been extensive research on Islamabad, mostly on its development based on modernist principles. Where transportation issues have often been brought to light; they have been mostly based on Gender based travel behaviors. The potential of Transit Oriented Development has also been discussed a lot owing to the polycentric masterplan of Islamabad. In terms of Urban Form and morphology, Ekistics have been widely studied as well. While Islamabad has been discussed extensively under the umbrella of Ekistics, modernist principles and TOD, there is a dearth of knowledge concerning its "automobile dependent nature" and the policies that promote it. This thesis aims to explore this relationship, by understanding the characteristics of modernist planned cities, the phenomena of automobile dependency and exploring the possible relationship between the two while simultaneously looking at the other stakeholders that lead to it. Hence, this thesis becomes important in understanding the factors that influence automobile dependency in cities and what could be done to tackle the problem of unsustainability in such cities. Apart from this, the research has explored other factors such as politics, regulatory bodies, housing authorities, public transport bodies, private transport sectors, etc. in making Islamabad automobile dependent. The thesis has also highlighted the missing layer of Public Transport and the other factors, apart from the zoning regulations, that have led to Urban Sprawl, low-density and Car-Dependency in Islamabad.

The relationship between modernist characteristics of Islamabad Masterplan and automobile dependency in the city provides guidelines as to what changes in the Zoning regulations can reverse the process. This is especially important since CDA under the guidelines of Federal Government is working on the Review of Islamabad Master Plan 2020-2040. Similar to how CDA had amended the zoning regulations

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in 1992 and 2010, this research can be used to tackle the issue of low-density in all the Zones of Islamabad.

Furthermore, in the absence of a Transport Policy of Islamabad, the recommendations suggested later in the Appendix H can be used in a formal document to solve the problem of Automobile Dependency in Islamabad. By looking at examples of other automobile dependent cities around the world, the thesis tries to highlight the factors that cause such phenomena which can be used to develop regulations that undo such actions. One of such solutions is the increase of density in the centre as well as developed mixed use zones, which would reduce the travel distances between various functions. Another solution is to regulate the land prices in different Zones of Islamabad, which would discourage the migration of residents to suburban areas in order to find affordable living. By studying these examples, the stakeholders can take a cue as to how simple amendments in zoning regulations can reduce Suburban Sprawl in the city. The research would also help in planning the future growth of Islamabad along with the usage of current facilities and features to develop an Integrated Public Transport System,

As highlighted through the opinions of residents obtained through various sources, the citizens are in dire need of and Integrated Public Transport system which can solve their daily commute issues. The data presented in Chapter 4 and 5 reflects the problems faced by the residents of Islamabad due to automobile dependency and urban sprawl. Not only has it increased the cost of living, but also degraded the quality of life in the city. This data can be used by relevant authorities to understand and prioritize the issues faced by the residents of Islamabad.

Studying Islamabad on a Macro, Micro and Meso scale helped in understanding the different issues at hand that have developed due to strict zoning regulations in the city and automobile dependency. This data would be of use for planners, policy makers and ground workers, while developing a Transport policy for the city as well as for CDA in re-evaluation of Zoning. It also helps in understanding how the Masterplan has changed overtime and what potential it holds for future development.

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Since Islamabad is the only planned modernist city of Pakistan built as a sustainable city, it is important to make amendments that serve as model for other cities to achieve Self-sufficiency. In order to achieve Doxiadis's utopia of Dynapolis, it is important for the authorities to take a departure from pre-determined growth patterns and make amendments according to the present situation. Hence it is important to recognize the following;

- Islamabad masterplan developed by Doxiadis should not be treated as bounding artefact, which pre-determines the growth and inhibits the adaptive capacity of the city. Amendments to the Masterplan should be made according to the current situation and requirements,
- It is of utmost importance of having a Federal Mass Transit Authority which regulates the transportation issues of Islamabad

In the light of the above two proposals, the following measures could be taken:

Compact City:

The current layout of Islamabad can aid in the development of compact city by intensification of development and by creating density in the Sector Centres. The existing low-density areas can be converted into high-density and can move towards Infill development rather than developing new suburban development at fringes/edges. The current availability of sectors near Zero point can also promote infill development.

The Diversity of programs in the Sector Centres and mix of residential and office areas in CBD can also help in achieving a Compact City. This will eventually result in reduced distances between urban activities and reduced need for motorized trips. Furthermore, the current plans of Government to demolish existing Low-density government owned houses in G-6 to develop mixed used living can also serve as a potential to move towards high density.

Corridor Development:

The grid plan of Islamabad supports corridor / linear development. All types of use already exists in Blue Area, the CBD of Islamabad. There is a potential of Corridor Development along Jinnah Avenue, earlier known as Capital Avenue, which runs along the CBD of Islamabad i.e. Blue Area. The current commercial + corporate CBD can be developed into a high-density urban pattern.
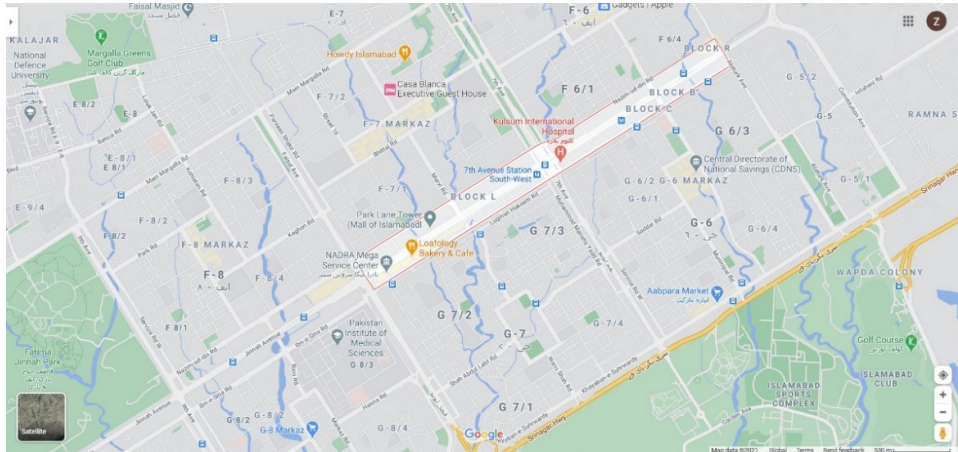
Figure 6.1. Rectangle shows the CBD of Islamabad, Blue Area. Source: Google Maps

The second Corridor Development can be done along the existing Metro Bus route that connects the twin cities Islamabad and Rawalpindi, running through 9th Avenue towards Faizabad. The stations along this route can be supported with high density, dense street pattern, high connectivity and walkability.

Para-transit:

Some Metro stations on 9th Avenue are near Taxi stands which could be integrated to solve the problem of last mile by integrating them with Public Transport and improving the pricing and safety of these paratransit modes. Similarly, in each Sector Centre, locally known as Markaz, there is a Wagon stop which could be integrated in the public transport system.

Energy Efficient cars:

With Islamabad being home to National University of Science and Technology (NUST), which won the Shell Eco-marathon 2019 by proposing an energy efficient car[37], the city can use the support of the university to come up with a plan of promoting such vehicles as well as researching and finding better use of renewable sources as fuel.

Non-Motorized Transport:

There is a potential to promote Non-motorized transport with already bicycle lanes dedicated in Shakar Parian and Club Road. The already existing Islamabad Cycling Association[38] can help in curating awareness raising campaigns. There are also 8 hiking trails to Margalla Hills[39], which are frequently used by the citizens of the Capital. These can help in promoting the walking culture in general public.

Pedestrian Zones:

Sector Centres like Jinnah Super, F-7 and F-6 Markaz are closed for vehicular traffic on festival days. This precedent can be used to encourage the idea of vehicle free centres.

Online Taxis:

There is a well-established network of online taxi services in Islamabad like Careem, Uber and Swvl with a huge customer network in the capital city.

Concluding Remarks

Islamabad is witnessing a population growth rate of 4.6% per year. As predicted by the World Population Review, the urban population of Islamabad is set to increase by 2% every year. In the light of such numbers, it is important to revisit the adaptive

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[37] (Saeed, 2019)
[38] (ICA, 2020)
[39] (Environment, 2020)

capacity of the city in order to tackle the issue of overburdening of infrastructure and utilities in near future. Imagined as a self-sufficient city, the Federal Capital currently faces an issues of Food Security due to the excessive buildup on the agricultural lands of Zone IV and Zone V. The modern sustainable city is currently facing the problem of sub-urban sprawl along with rising traffic issues. This research has tried to touch upon all these issues to help in suggesting future policies that can tackle unsustainable growth in the city.

Moreover, building up on this research, detailed surveys can be conducted by relevant authorities to understand the preferences of citizens with regards to modes of transport. The correlational charts can provide a guideline as to how various organizations can work in coordination with each other to evaluate the urban problems of Islamabad and develop solutions accordingly. Further, with the current layout of Islamabad Masterplan and growth patterns, the thesis gives an insight of the possibilities of corridor development and transforming sprawling automobile dependent cities to smart compact transit dependent cities by utilizing their polycentric model as discussed in this chapter. Building upon these suggestions, a hypothetical Transport Policy for Islamabad which can serve as a guideline for relevant authorities has been attached in the Appendix H.

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APPENDICES

A. Land Use for Zone IV, Islamabad. Source: CDA

BHARA KAHU BYPASS ROAD, ISLAMABAD

The Master Plan of Metropolitan Area was prepared in 1960 and approved by the then Federal Cabinet. As per Master Plan, the Metropolitan Area was divided into three major parts i.e.

    a. Islamabad

    b. National Park

    c. Rawalpindi and the Cantonments

Copy of the Master Plan of the Metropolitan Area, provided in Report DOX-PA 88, tilled "Program and Plan" Vol-2 of 2, Page-373 is at **Annex-A.**

2.   As per Para-911 of the above Report, functions of the National Pak are described as under **(Annex-B):**

911.   a. Educational functions of national importance: National University, etc.

        b. Institutions of a National character, i.e. National Research Centre, National Medical Centre.

        c. National Sports Centre.

        d. National Park functions (preservation of rural life, wild life, forests).

        e. Zoo, botanical gardens.

        f. Exhibition grounds.

Copy of the Master Plan of the National Park in Report DOX-PA 88, tilled "Program and Plan" Vol-2 of 2, Page-385 is at **Annex-C.**

3.   Further, details of the provisions of the National Park are explained in Paras 950-961 of the said Report **(Annex-D)**. Para-957 is reproduced below:

957.   The second category of institutions to be built within the National Park area are educational and research institutions, such as a National University, National Research Institution, etc. Such functions will be created in several parts of the National Park and especially on the sides of the hills. This is the best location, since the tops of the hills should be preserved as parts of the natural beauty of the National Park, and not spoiled by any building except the small restaurants and tea-houses provided for visitors and tourists, while the lower parts of the valleys are better for cultivation.

4.   The site for the National University was earmarked in the South-East of Rawal Lake **(Annex-C)**.

5.   In Para-928 of the said Report, the Margalla Road has been defined **(Annex-E)**. The same has been shown on the Map placed at Page-377 of the same

B. Population Density and Number of plots in each Zone of Islamabad, Source: CDA

Pakistan Bureau of Statistics (PBS) being the National Statistical Office (NSO) is responsible for collection, compilation and dissemination of Census data. It disseminates the data to facilitate the data users as per data dissemination policy of PBS. Further; the projection of population is the mandate of National Institute of Population Studies (NIPS), Islamabad.

It is informed that the housing units data is not available, with PBS, however, population and number of households data as per Population & Housing Census 2017 in respect of Islamabad is given below:-

Islamabad District	Total Population	Total No. of Household	Avg. Household Size
	2,003,368	332,145	5.86

It is pertinent to mention here that PBS is going to conduct 7th Population & Housing Census, the first ever digital census in Pakistan in 2023 through which data of "Housing Units" will also be collected and available for data users.

Summary

S.No	Section	Residential Houses	Apartments/Flats	Total
1	BCS-I	7871	1633	9504
2	BCS-II	13374	2337	15711
3	BCS-III	18013	848	18861
	G. Total			44076

CDA Schemes,
Plots in
Zone-5   83912.

Zone 4&5   13984

Katch' Abedis   16991

TOTAL.   99595
Private Schemes,
Zone 2   36291
    4   6439
    5   21925
    E-11   2887
                 67542.

C. Speed Limits for Islamabad Highways and Roads. Source: ITP

NOTIFICATION

No.3(34)-Law/2006. In exercise of powers vested in him vide Presidential Order No.18 of 1980 read with Ministry of Law and Justice Notification No.F-17(2)/80-Pub, dated 31.12.1980 and Section 75(2) of the Motor Vehicles Ordinance, 1865, the Chief Commissioner, Islamabad Capital Territory is pleased to fix the following limits of speed for various vehicles in ICT area:-

Sr. No.	Road Highways	Proposed for LTV speed limit in (KM/H)	For HTV/ PSV	Built up area
1	Kashmir Highway	80	65	-
2	Islamabad Highway	80	65	-
3	Murree Road	80	65	Bharakau-30
4	Constitution Avenue	70	65	-
5	Jinnah Avenue	70	65	-
6	Faisal Avenue	70	65	-
7	Khyaban-e-Iqbal	70	65	-
8	Park Road	70	65	-
9	New 7th Avenue	70	65	-
10	New 9th Avenue	70	65	-
11	Lethrar Road	40	40	-
12	Kahuta Road	60	60	Sihala Bazar-30
13	I.J. Principal Road	60 (Faizabad to Nasirabad)	60	-
14	Major Roads	50	50	-
15	Service Road	Dualized - 60 Single - 40	40	-
16	Street and Sectoral Roads	30	25	-
17	Roads/Streets near Schools/ Hospital	30	25	-

D. Traffic Accidents data from 2009-2020

19.4 Traffic Accidents

Year	Total number of accidents	Accident		Persons		Total number of vehicles involved
		Fatal	Non-Fatal	Killed	Injured	
PAKISTAN						
2009-10	9747	4378	5369	5280	11173	10496
2010-11	9723	4280	5443	5271	11383	10822
2011-12	9140	3966	5174	4758	10145	9986
2012-13 *	8988	3884	5104	4719	9710	9876
2013-14*	8359	3500	4859	4348	9777	9423
2014-15*	7865	3214	4651	3954	9661	8949
2015-16*	9100	3591	5509	4448	11544	10636
2016-17*	9582	4036	5546	5047	12696	11317
2017-18	11121	4829	6292	5948	14489	13134
2018-19	10779	4878	5901	5932	13219	12908
2019-20	9701	4403	5298	5436	12317	12894
PUNJAB						
2009-10	5344	2590	2754	3083	5856	5344
2010-11	5420	2591	2829	3167	5809	5420
2011-12	4990	2361	2629	2888	5071	4990
2012-13	4587	2213	2374	2692	4515	4587
2013-14	3696	1717	1979	2145	3941	3696
2014-15	3054	1435	1619	1750	3652	3054
2015-16	3288	1576	1712	2053	4550	3288
2016-17	3819	1989	1830	2494	5231	3819
2017-18	5093	2708	2385	3371	6772	5093
2018-19	4823	2808	2015	3423	5916	4823
2019-20	4294	2471	1823	3102	5746	5498
SINDH						
2009-10	1465	883	582	1031	1261	1580
2010-11	1270	758	512	927	1071	1541
2011-12	1054	681	373	756	681	1121
2012-13	935	582	353	696	637	960
2013-14	945	613	332	791	893	1103
2014-15	881	583	298	771	863	1029
2015-16	924	634	290	749	754	1144
2016-17	880	608	272	786	970	1009
2017-18	848	586	262	802	838	1015
2018-19	972	620	352	725	829	1142
2019-20	858	572	286	741	741	1026
KHYBER PAKHTUNKHWA						
2009-10	2559	712	1847	921	3560	3128
2010-11	2722	773	1949	986	4153	3479
2011-12	2772	785	1987	953	3913	3501
2012-13	2968	846	2122	1059	4016	3736
2013-14	3120	877	2243	1033	4257	3934
2014-15	3399	942	2457	1137	4524	4260
2015-16	4287	1083	3204	1299	5527	5490
2016-17	4256	1103	3153	1317	5804	5736
2017-18	4425	1119	3306	1295	6093	6052
2018-19	4337	1097	3240	1318	5798	6062
2019-20	3891	997	2894	1186	5069	5487
BALOCHISTAN						
2009-10	379	193	186	245	496	444
2010-11	311	158	153	191	350	382
2011-12	324	139	185	161	480	374
2012-13	297	136	161	163	362	381
2013-14	342	173	169	247	480	434
2014-15	315	147	168	178	440	389
2015-16	357	178	179	207	504	470
2016-17	401	209	192	321	567	537
2017-18	496	259	237	313	624	715
2018-19	409	226	183	330	542	642
2019-20	469	252	217	289	640	694
ISLAMABAD						
2012-13	201	107	94	109	180	212
2013-14	256	120	136	132	206	256
2014-15	216	107	109	118	182	217
2015-16	244	120	124	140	209	244
2016-17	226	127	99	129	124	216
2017-18	259	157	102	167	162	259
2018-19	238	127	111	136	134	239
2019-20	189	111	78	118	121	189

*- Islamabad Included.

Source: Provincial Police Department (Crime Branch)& Islamabad.

E. Islamabad Master Plan Review Report 2020-2040- Source:CDA

The Gazette of Pakistan

EXTRAORDINARY
PUBLISHED BY AUTHORITY

ISLAMABAD, FRIDAY, FEBRUARY 14, 2020

PART II

Statutory Notifications (S. R. O.)

GOVERNMENT OF PAKISTAN

CAPITAL DEVELOPMENT AUTHORITY

(Master Planning Directorate)

NOTIFICATION

Islamabad, the 11th February, 2020

SUBJECT:—REVIEW OF MASTER PLAN OF ISLAMABAD (2020-2040)
PREPARED BY FEDERAL COMMISSION (Interim Report)

  S.R.O. 110(I)(2020).—In exercise of powers conferred by Section 51 of the Capital Development Authority Ordinance, 1960 (No. XXIII of 1960), read with section 11 thereof, the Capital Development Authority has been pleased to notify with immediate effect till further orders following **"Interim Report on the review of Master Plan of Islamabad (2020-2040)"** prepared by the Commission constituted by the Federal Government of Pakistan and approved by the Federal Cabinet.

[No. CDA-30(15) (Noti)-SCB/2020/275.]

            SYED SAFDAR ALI,
            Secretary, CDA Board.

(273)

Price : Rs. 150.00

[5152(2020)/Ex. Gaz.]

F. Population and Annual Growth Rate for Islamabad- Source: PBS

TABLE - 1 AREA, POPULATION BY SEX, SEX RATIO, POPULATION DENSITY, URBAN PROPORTION, HOSUEHOLD SIZE AND ANNUAL GROWTH RATE

ADMN - UNIT	AREA (SQ. KM.)	POPULATION - 2017									POPULATION 1998	1998-2017 AVERAGE ANNUAL GROWTH RATE
		ALL SEXES	MALE	FEMALE	TRANS GENDER	SEX RATIO	POPULATION DENSITY PER SQ. KM.	URBAN PROPORTION	AVERAGE HOUSEHOLD SIZE		
1	2	3	4	5	6	7	8	9	10	11	12
ISLAMABAD DISTRICT	906	2,003,368	1,052,328	950,760	280	110.68	2211.22	50.37	5.86	805,235	4.90
RURAL		994,365	516,723	477,518	124	108.21			5.94	276,055	6.96
URBAN		1,009,003	535,605	473,242	156	113.18			5.78	529,180	3.45
ISLAMABAD TEHSIL	906	2,003,368	1,052,328	950,760	280	110.68	2211.22	50.37	5.86	805,235	4.90
RURAL		994,365	516,723	477,518	124	108.21			5.94	276,055	6.96
URBAN		1,009,003	535,605	473,242	156	113.18			5.78	529,180	3.45

200

G. Road Sections Blue Print of Islamabad- Source: CDA

X SECTION OF 130 MARKET ROAD AROUND THE MARKAZ (HALF PORTION)

X SECTION OF 100' WIDE ROAD FOR I-11/2

| GREEN | F.PATH | GREEN | R O A D | GREEN |

X. SECTION OF 110' WIDE MARKET ROAD (HALF PORTION)

| C.TRACK | GREEN | PARKING | ROAD | GREEN |

X.SEC. OF 110' WIDE ROAD AROUND THE MARKAZ (HALF PORTION)

LEGEND

Capital Development Authority

Planning Wing
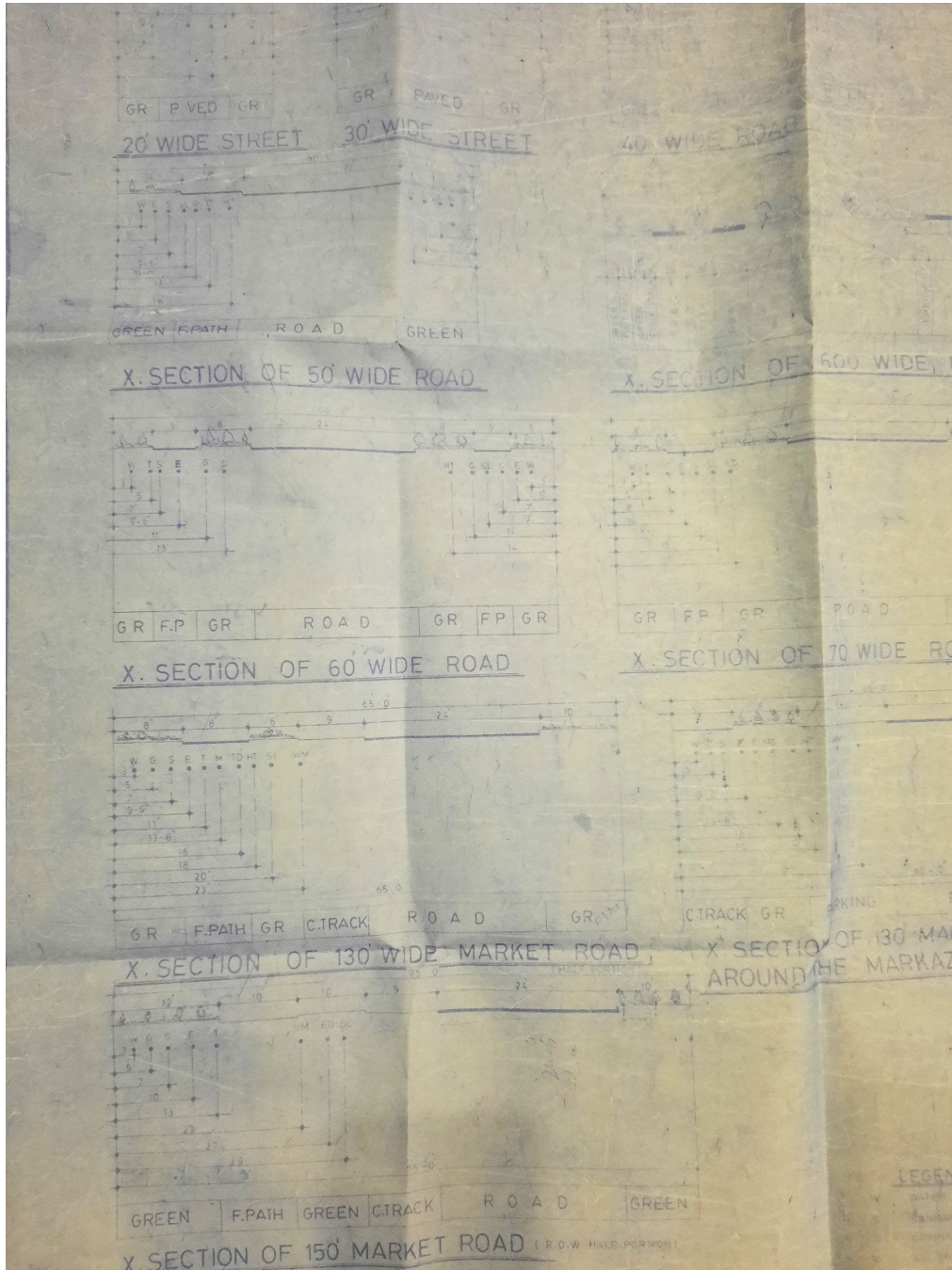
H. Hypothetical Transport Policy For Islamabad

(The following Transport Policy was developed as a part of CP704 Transport Policy under the guidance of Prof. Dr. Ela Babalik)

Potentials in Islamabad:

Polycentric City:

Islamabad has been developed as a Poly centric city, divided into Sectors of 2km x 2km. Each Sector is further subdivided into 4 Sub-Sectors with each Sector having a Sector Centre i.e. Markaz, and each sub-sector has a small market. In this way, all the Sectors are expected to be Self-sufficient having mixed used in their Sector Centres.
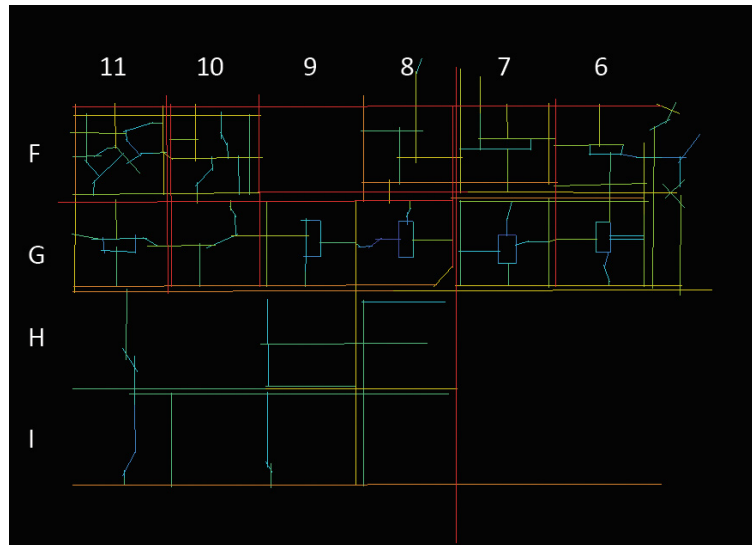
Islamabad has strong linear orientation around the sectors membrane and Radials within each modular sector of 2km by 2km, it makes the city polycentric. *Created using Alasdair Turner research handbook, UCL Depthmap 10*

The Sector Centre i.e. Markaz of each sector has Diversity of development such as workplaces, shops, recreation and other urban activities. They have the potential to accommodate housing as well. Currently, due to the unequal opportunities, people live in one sector and work in the other. The paratransit transport, if caters to all the sectors from the main Metro Bus route, and housing is shifted to CBD in Blue Area, the Metro Bus can cater to all of these.

It is easier to transform existing and sprawled/dispersed areas like Zone 5 of Islamabad towards a polycentric structure. New town centres along the Metro bus can make the form both Corridor and polycentric.

Transit Villages:

The new airport of Islamabad in Fateh Jang has led to announcement of various housing projects near it. With a Metro Line being constructed to connect Airport to the City Centre, these developments can be developed as Transit villages.
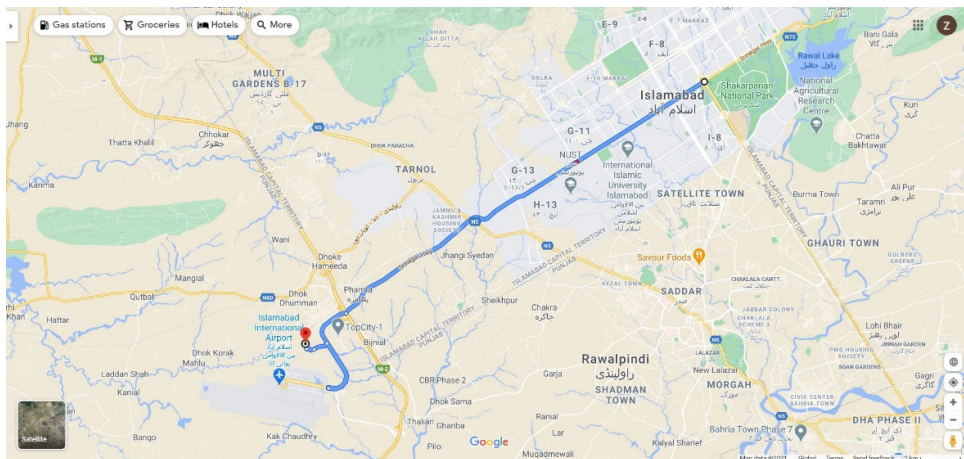

Fig: Location of New Islamabad airport, the proposed housing societies and the Metro route connection to Zero Point.

Land Use Development:

Capital Development Authority (CDA) has allocated new sectors near to the centre, Zero Point, that are yet to be designed. Land-use and spatial development policies in these new sectors could be developed in such a way that change travel behavior. The existing Sector Centres, with their mixed use, also have the potential to change the travel behavior by enhancing the program.

Youth of Islamabad:

59.38% of Islamabad's population in lies in the age group of 15–64 years[40]. With 77% of smart phone users in Pakistan belonging to ages 15-30, hence any proposal that relies on smart phones or technology in general will be easily adopted by the end users.

1. **Vision, Main Goal and Guiding Principles**

2.1 ISLAMABAD 2030

Imagined as a Sustainable city in 1960s by C.A. Doxiadis, it would be fitting to present a Transport policy for Islamabad that promotes Environmentally, Economically and Socially Sustainable Urban Transport. In accordance with United Nation's 2030 Agenda for Sustainable Development[41] in Pakistan, Islamabad's urban transport vision is to:

"Provide environmentally friendly, safe, affordable, equitable and accessible means of transport, ensuring minimum pollution, minimum sprawl and equal opportunities for all."

A short explanation of each of these terms are briefly explained below:

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[40] https://en.wikipedia.org/wiki/Demographics_of_Islamabad
[41] https://pakistan.un.org/

1. **Environmental Sustainability:**

The urban transport solutions should be **environmentally friendly**, that reduce the environmental impact of the transport system, as well as are able to adapt to climate change. It is pertinent to provide solutions that are durable and are able to be sustained over time environmentally. This will also make them economically sustainable. The transport policy should promote land use planning that ensures **minimum sprawl** which will eventually lead to **minimum pollution.**

2. **Economic Sustainability:**

It is important that economically viable solutions are not only **affordable** for all but are such that there is **safety** in service and infrastructure according to international best practices, which in turn reduce traffic congestion and eventually accident costs. This will also lead to minimum risks on health and life expectancy. Such efficient solutions will also ensure a system which minimizes travel time and costs for its users. It is also important that an integrated system of Public Transport is devised which recognizes that all **means of transport** are involved.

One of the major potentials of Islamabad is that it is a polycentric city, built on the concept that each sector of 2km x 2km is going to be Self-Sufficient. Each Sector Centre is a mixed used development. With a smart phone user base of 77% belonging to ages 15-30 along with a well-established network of online taxis and mini-buses Careem, Uber and Swvl, it presents a large market that makes room for a policy utilizing technology to work. With the sector centres already having wagon stations and taxi stops, these online taxi services can be integrated with Metro Bus, to form a Multi-modal transport, that brings people to the Sector Centre from nearest Metro Station through feeders and further transfer them to residential areas from Sector Centre through these Para-transit modes. This will eventually reduce the cost of travel significantly.

Similarly, with petrol already being priced at PKR109/litre, it is important that alternatives are provided that have minimum dependence on external sources, like the Energy Efficient cars proposed by NUST, Islamabad..

3. Socially Sustainable:

The policy should be such that ensures reliable and **equitable access** to workplace, commercial areas, education, retail and other services. The Public Transport should be of such a quality that overcomes social exclusion and is **accessible** to all irrespective of location, income, gender, age, race, or disability. There should be an implementation of Universal Design so that all forms of transport and transportation centres are **accessible** to all physically as well. Similarly, it is important to focus on Non-Motorized Transport (NMTs), in order to give equal accessibility to pedestrian population as well.

2. Strategies and Initiatives

3.1 Public Transport Investments and Operations/Management;

Islamabad BRT System

Phase 3 and 4 of Islamabad BRT System to run from Zero Point to Rawat (shown in Red) and from G-9 to F-11 along Nazimuddin Road (Shown in Orange). The construction of overhead bridges and underpasses to begin after approval of budget from the Federal Government in the Fiscal Year of 2021. This extension will provide equal access to Public Transport to the residents of all Sectors and Zones of Islamabad.
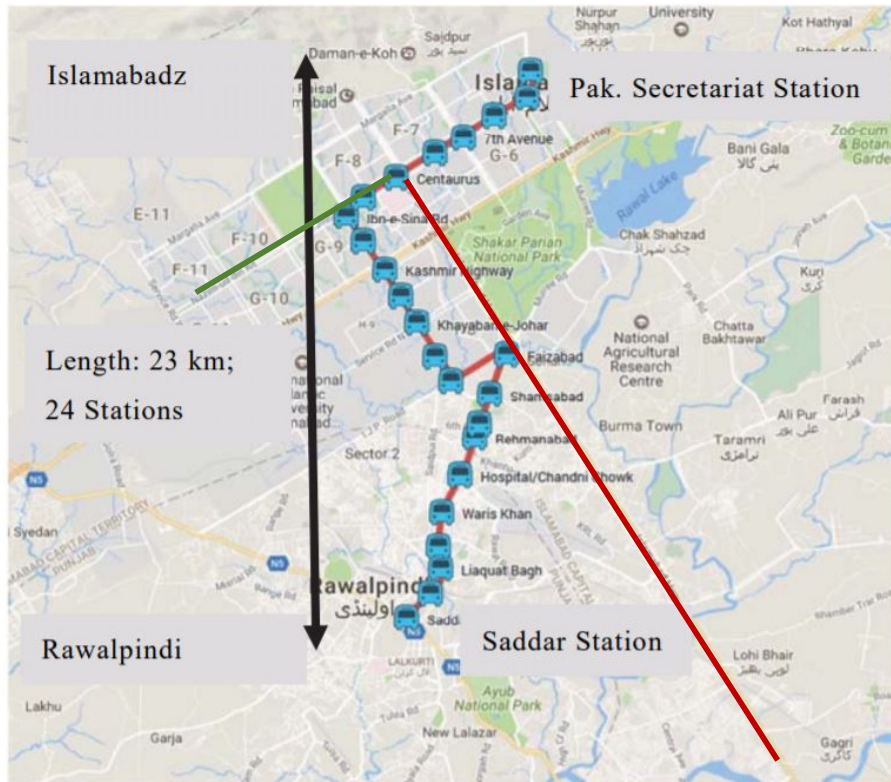
Figure 1. Route of RI BRT corridor and 24 stations

Fig: Proposed Phase 3 and 4 of Rawalpindi-Islamabad BRT. The red line shows Islamabad Expressway from Zero Point to Rawat and Orange line shows Nazimuddin Road from G-9 to F-11.

The current Metro bus cards should be changed to e-card system i.e. *Islamabad Sustainable Transport Card* for different use of mass transportation systems ranging from feeders, to bus to taxis etc. The Transport Card will have subsidized rates for citizens over 60 years of age and students to encourage the use of Public Transport.

Introduction of Daewoo Private Buses:

150 new buses, built on Universal Design guidelines, from the well-established network of Daewoo, which currently serve the Motorways of Pakistan, to be integrated in the Urban Transport Network of Islamabad. The buses will have fixed

routes, running daily from 08:00hrs to 23:00hrs, covering all Zones and all sectors of Islamabad.

Each sector will have 05 stations, i.e. 04 in the markets of sub-sectors and 01 in the Sector Centre. The buses will arrive on each station after every 15 minutes. Each trip will cost PKR40 (1.79TL) for passengers who do not have the *Islamabad Sustainable Transport Card*. For card owners, the cost will be PKR30 (1.35TL) and for students and citizens above 60 years having card, the cost will be PKR20 (0.90TL) for each trip.

The buses will be a partnership between CDA, Capital Development Authority, the newly established Federal Mass Transit Authority and Daewoo. After procurement of budget from the Federal Government, the Federal Mass Transit Authority is expected to initiate the project with Daewoo, to ensure subsided rates for citizens of Islamabad. The CDA will ensure the allocation of one lane for Daewoo buses on all routes and will proceed with the development accordingly.

Para-transit And the Last Mile:

05 Metro stations on 9th Avenue, which are near Taxi stands will be integrated with Metro bus to solve the problem of last mile. The Taxi Stands will be used by Online Taxi services, Careem, Uber and Swvl, which will provide services on a discounted price of 50% to passengers having *Islamabad Sustainable Transport Card.*

The Hyundai Wagons and other private taxis will also be integrated in the system after their upgradation and quality assurance check by the Federal Mass Transit Authority. Owners of vehicles which do not comply with the safety standards as required by Islamabad Traffic Police will be heavily penalized along with the cancellation of vehicle registration and driving license of the owner. Similarly, vehicles which run on low-quality diesel and CNG will be replaced step by step by implementing policies such as increased tax.

Those vehicles registered for integration with Metro Bus in SWVL, Careem, Uber etc will have counter incentives. The implementation body needs to mark a cutoff date for the smooth transition of system.

These paratransit modes will also be available in each Sector Centre, locally known as Markaz, near the already existing Wagon stops. The current paratransit includes taxis and Hyundai wagons having some fixed routes. These can be used as feeders from METRO bus in Islamabad in the form of:

a) Taxis (Private, Careem and Uber) doing personalized door-to-door service;
b) SWVL and wagons doing shared service with routes determined by individual passengers; or regular service along fairly well-defined routes i.e. Sector Centre to Sector Centre (similar to bus transit).
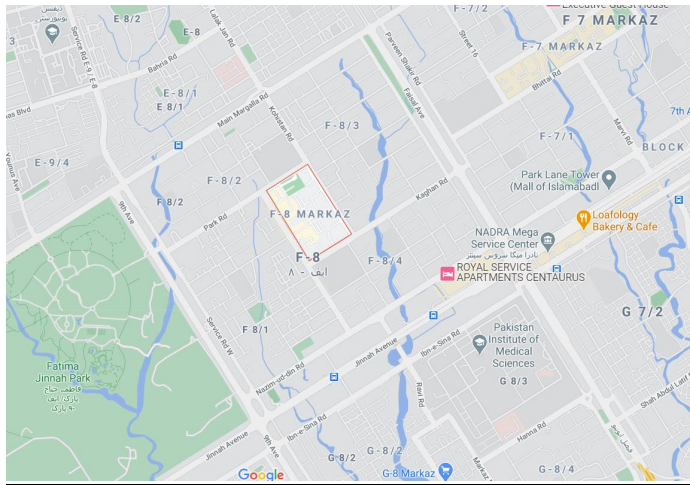

Fig: A typical 2km x 2km sector of Islamabad, having Markaz as the sector centre with 4 subsectors around it, each having smaller sub sector centres i.e. local markets. (Figure shows Sector F-8)

Going Online:

"Sustainable Transport for All" application to be developed under the Vision Islamabad 2030, which would integrate all types of Public and Private Transport in Islamabad. The project will be a partnership between Careem and Federal Mass Transit Authority, which will use the existing data and user presence of this private company, to integrate the newly introduced Daewoo bus service and Paratransit modes into the same network. This will eventually lead towards a well integrated Inter-modal Transport in Islamabad. During the first 06 months, the website will give 50% discount to all users having accounts, in order to encourage citizens to shift towards Public Transport.

3.2 Private Transport Investments and Operations/Management;

Energy Efficient cars:

With Islamabad being home to National University of Science and Technology (NUST), which won the Shell Eco-marathon 2019 by proposing an energy efficient car[42], the campus will serve as a pilot site to introduce the use of such cars and raise awareness among the citizens of Islamabad. To facilitate the students, recharging kiosks will be introduced throughout the campus.

After the successful running and testing of energy efficient cars in NUST, the Federal Mass Transit Authority in collaboration with Federal Government will give a tax benefit of up to 50% to the first 5,000 buyers of these vehicles, with exemptions up to 60% for employees of private companies in Islamabad.

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[42] https://www.techjuice.pk/nust-teams-energy-efficient-car-wins-big-at-the-shell-eco-marathon-2019-beating-india-among-others/

Electric Scooters:

Electric Scooters to be introduced in all the Universities of Islamabad. Recharging electricity stations for these scooters will be provided near each department and faculty area.

3.3 Car Parking Planning and Management;

Parking Charges

All parking lots in the sector centres i.e. Markaz and CBD i.e. Blue Area will have parking taxes, charged throughout the working hours and the money to be spent on the upgradation of public transport. This will apply to all the visitors of the Sector Centres.

Simultaneously, citizens working or residing in Markaz or Blue Area, should apply for *Markaz Parking Card*, which would be a onetime purchase of parking permit in the Sector Centre. The owners will have to pay a monthly fee of PKR2500/= (112TL) for this card. Under the policy of Reduced Car Park Capacity in city centres, each office in the Sector Centre will ensure that 1/3 of their staff is given these parking permits. Islamabad Traffic Police kiosk in each Sector Centre will ensure the management of this process. This will in turn help in reducing car ownership.

Congestion Charging:

Rather than adding new lanes after every year to the highways of Islamabad, according to the new policy by the Federal Mass Transit Authority, vehicles on highways facing traffic congestion during peak hours, which are carrying maximum 3 passengers will be charged congestion fines on Islamabad Traffic Police Tolls. This will be monitored by integrating the current set up of Islamabad Safe City Project, which monitors all the cars on the entrances and exits of all Islamabad highways and major avenues through High Resolution Cameras.

The owner of cars will be sent these fines online through vehicle registration numbers and driving license details along with the help of National Database &

Registration Authority (NADRA). This will help in encouraging citizens to use Public transport or use cars to their full capacity.

Heavy Traffic Timings:

Until the completion of construction of Ring Road from Rawat to GT Road, all the heavy traffic coming from GT Road to Islamabad will be stopped at T-Section of Rawat during peak hours from 07:00hrs – 10:00hrs and from 16:00hrs – 19:00 hrs. Simultaneously, heavy traffic from Murree Road heading towards GT Road via Islamabad Expressway will also be stopped at Faizabad Interchange. This will be implemented by Islamabad Traffic Police.

School Roads:

From June 2021, private cars will only be allowed on roads hosting schools at 30 kmph (18 mph), and on street parking will be metered. Along with this, priority will be given to the people not in cars.

3.4 Non-Motorized Transport;

Bike Sharing:

In line with Islamabad's vision of social, economic and environmentally sustainable transport, NMTs will be incorporated in the entire system; a bike sharing system is to be introduced in the city. All metro stations to have dock and locking systems for bike sharing. The system will be based on fee-based pricing policy enabling the bicycles' usage for free for the first 30 minutes for casual users whereas free for 45 minutes for members, then the price increases for every 30 minutes.

The already existing Islamabad Cycling Association[43] (ICA) in coordination with Capital Development Authority will identify bike routes throughout the city. Bicycle boulevards, one lane on the road, will be dedicated to bicycles under this plan. The

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[43] https://www.facebook.com/pg/IslamabadCyclingAssociation/about/?ref=page_internal

bikes will be procured by Federal Mass Transit Authority and integrated into the existing bike sharing system of ICA after necessary upgradations and expansions. All the bike dock and locking areas will be located within the pedestrian catchment area

Pedestrian Zones:

Sector Centres like Jinnah Super, F-7 and F-6 Markaz to be closed for vehicular traffic on weekends and festival days. This precedent can be used to encourage the idea of vehicle free centres. Parking lots to be developed at the periphery of these centres, where the visitors can park their cars on a parking fee of PKR500/= per hour (23TL), which will increase to PKR700/= per hour (32TL) after 3 hours.

The idea is to eventually pedestrianize half of all Sector Centres' streets and entirely close them to through traffic with several car parks accessible on an 'in and out' basis

Zebra Crossings and Footpaths to be integrated in all Sectors of Islamabad under the supervision of Capital Development Authority. Overhead bridges to be constructed at adequate distance on all highways and avenues of Islamabad. The interventions are to be made under the guidelines of Universal Design. Similarly, existing sidewalks will be improved with respect to their width, lighting, clearing obstructions etc.

3.5 Local Awareness Raising Campaigns;

Let's ride together:

The already existing Islamabad Cycling Association[44] will curate awareness raising campaigns like ***"Let's ride together"*** every month to encourage cycling in the city. The ICA will also run training for inexperienced cyclists every 06 months to promote cycling culture in the Federal Capital.

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[44] https://www.facebook.com/pg/IslamabadCyclingAssociation/about/?ref=page_internal

Car-Sharing Club:

A citywide car sharing club to be inaugurated under the banner of Islamabad Club which will encourage citizens to car pool and share rides.

Marketing and Promotion:

Transport policies alone cannot change travel behavior. In order to create awareness amongst citizens, Federal Mass Transport Authority will highlight the importance of using public transport and its economic and environmental benefits through radio, messages on smart phone , TV and user friendly displays on the kiosks, with the help of Pakistan Telecommunication Authority (PTA).

"The Campus is Ours":

With having 16 universities in the city, student bodies in these campuses can run campaigns such as *"The Campus is Ours"*, once every month, in which vehicular access is restricted inside the campus area. Such campaigns can also be promoted via Social Media to raise awareness among other citizens of Islamabad.

Policies to be made a part of the school curriculum:

Islamabad Vision 2030 to be made a part of all school and college curriculum in partnership with Federal Board of Intermediate and Secondary Education (FBISE), to raise awareness of the environmental concerns in Islamabad. All the new policies will be taught in educational institutions to raise awareness among citizens.

Car-Free Day and Street is Ours:

Car free day to be celebrated in Private Housing Authorities once a year to encourage motorists to give up their cars for a day. Similarly, once a month, *The Street is ours* campaign to be run in Sector G-6, which houses the narrowest streets of Islamabad i.e. 6m. By including local governments in this process, the street is closed to vehicle traffic and opened to the use of pedestrians, cyclists and disabled people. Thus, street residents have the opportunity to walk comfortably in front of their homes, ride a bicycle, play games, do sports and have a picnic. In addition, activities such as traffic

training and painting workshops for children, music concerts, theater performances and yoga are organized for participants of all ages together with other non-governmental organizations throughout the day.

3.6 Other Possibilities;

<u>**Polycentric City- Making the Sector Centres Self-Sufficient:**</u>

CDA in collaboration with Private investors will add Apartments and Residential Units in all the Sector Centres i.e. Markaz of Islamabad. This will create a mixed used development with the already existing programs such as workplaces, shops, recreation and other urban activities.

Similarly, CDA to introduce a secondary branch of CBD in Zone 5 of Islamabad in collaboration with Giga Mall and World Trade Centre, already present on the periphery of Zone 5. This will reduce the travel distance of residents of Zone 5, who commute minimum 50 kms to and fro daily, to their workplaces in the centre. The Diversity of programs in the Sector Centres and mix of residential and office areas in CBD can also help in achieving a Compact City. This will eventually result in reduced distances between urban activities and reduced need for motorized trips.
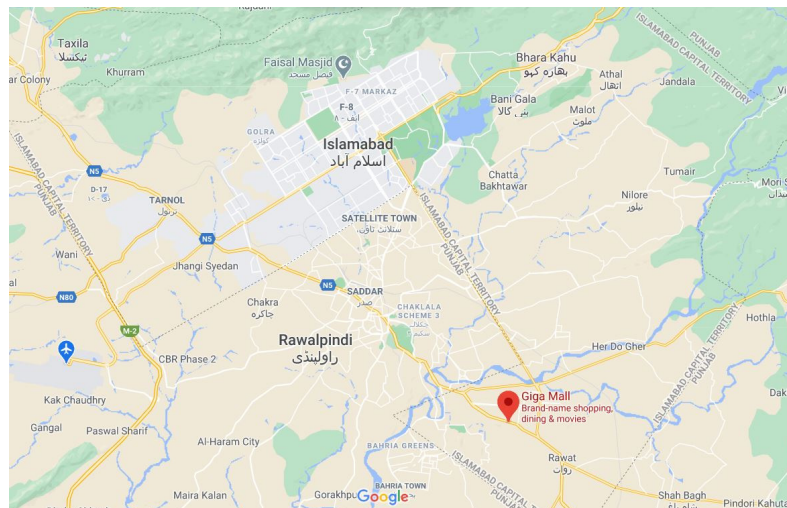
Fig: Giga Mall and World Trade Centre in Zone 5 Islamabad

New town centres to be developed by CDA under Vision 2030 along the Metro bus, to make Islamabad both Corridor and polycentric.

Transit Villages:

The land allocated adjacent to New Islamabad Airport in Fateh Jang for housing societies to be developed on the model of Transit Villages, feeding on the new Metro Line by connecting airport to Zero Point in Islamabad. The Private Housing Authorities which take this initiative will be given incentives by the Capital Development Authority (CDA) will regards to various types of Tax exemptions.

Transit-Oriented Development:

Islamabad's CBD i.e. Blue Area to be developed on the model of Curtiba. Already being accessible with Islamabad's BRT, the CDA will now allocate housing units and apartments in the CBD in order to transform the existing pattern into a TOD by introducing a diversity of land uses. Similarly, commercial programs to be plugged in by CDA in the residential area around 9th Avenue, which is in proximity of the Metro stations.

Compact City:

CDA in collaboration with National Census will identify the existing low-density areas in Islamabad and convert them into high-density to move towards Infill development rather than developing new suburban development at fringes/edges. This will be done after analysis of quality of the infrastructure in these areas and whether they can support a higher density. The current availability of sectors near Zero point can also promote infill development.

The 2003 plan of Government to demolish existing Low-density government owned houses in G-6 to develop mixed used living can be re-proposed to move towards high density.

Corridor Development:

New Corridor to be developed along Jinnah Avenue, earlier known as Capital Avenue, which runs along the CBD of Islamabad i.e. Blue Area under a partnership between CDA and Private investors. The current commercial + corporate CBD will be developed into a high-density urban pattern. The second Corridor Development will be done along the existing Metro Bus route that connects the twin cities Islamabad and Rawalpindi, running through 9th Avenue towards Faizabad. The stations along this route will be supported with high density, dense street pattern, high connectivity and walkability.

Land Use Development:

The new sectors in the range of B, C and D near Zero Point, Islamabad will be developed on the model of Self-Sustainable Sectors. The sector Centre of these sectors will have a mixed used development which is anticipated to bring a change in travel behavior of the residents.

Smart Growth:

CDA with the collaboration of Private Housing Authorities will work on **"Smart Cities"**, a development project for the new sectors in Zone I, Islamabad. The project will offer a range of housing opportunities and choices in these Sectors which will encourage the citizens of Islamabad to stay near the centre, rather than moving to the periphery. The development decisions will be predictable, fair and cost effective according to the new policy. The real estate developers will have to set the prices in accordance with those defined by CDA. This way, open spaces, critical

environmental areas and agricultural land can be preserved Zone 4 of Islamabad, which is currently suffering from Urban Sprawl due to cost-effective living opportunities.

With the Inter-Modal Transport System of Islamabad, accessible under the *Islamabad Sustainable Transport Card*, the existing Metro Bus will be integrated with Swvl, which is a privately owned shared Taxis or Minibuses having stops in all commercial centres of Islamabad which encourages Smart Growth. Walkable neighborhoods and sector centres also promote such type of growth.

3. IMPLEMENTATION AND ROAD MAP:

Federal Mass Transit Authority

Like other provinces, Federal Mass Transit Authority to be developed by the Federal Government which will be responsible for planning, construction, operation and maintenance of mass transit systems in Islamabad. The Authority will be required to get the traffic problem of Islamabad across to the Federal Government, which will help in allocating funds in the country's annual budget. The authority is also expected to provide the data base, the web space and funds required for the policy plan with cooperation from the board of directors and government commerce department.

Taxation:

Excise and Taxation Office (ETO) Islamabad will increase the tax on the purchase of new cars by users who already own one car in order to reduce the Auto-mobile dependency in Islamabad and encourage the use of Public Transport. The tax will increase by 15% on the purchase of second car and a further 25% on the purchase of a third car. Every further purchase will increase the tax by 15%.

CONCLUSION:

The transport policy document for Islamabad can be implemented successfully if a Federal Mass Transit Authority is formed which is responsible for planning, construction, operation and maintenance of mass transit systems in Islamabad. Similarly, coordination between this authority, CDA and Islamabad Traffic Police is of the utmost requirement to achieve the results. The policy, through coordination can help in achieve an environmentally, economically and socially sustainable urban transport system in Islamabad. The system envisages a change in the city transport by bringing in a combination of bus, cars and bicycles as a cohesive system as opposed to only one Metro bus as the sole public transport option in the city.